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THE BACTERIOLOGY OF CHRONIC BRONCHITIS: THERAPEUTIC IMPLICATIONS.

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CHRONIC BRONCHITIS is not usually regarded as a severe disease in Australia, but it was certified as the underlying cause of death in over 1800 cases during 1958 and 1959. As exacerbations of bronchitis lead to considerable morbidity and loss of time from work, the role of antibiotic therapy deserves some attention. If only on the grounds of expense, considerable responsibility is involved in ensuring that it is appropriate and as effective as possible. Many controlled trials, or at least critical studies, of long-term chemotherapy have appeared. Almost all the possible oral antibiotics have been tried, including various combinations of antibiotics either commercially available as such or supplied to the patient as separate preparations. In spite of this voluminous literature, inadequate or inappropriate chemotherapy is commonly encountered in practice. The reasons for this are probably several. The multiplicity of drug régimes used in reported trials and the partially conflicting results described have unduly complicated the problem. Failure to appreciate that the results of a single sputum culture, particularly when performed in "routine" fashion, may not accurately reflect the true situation is common; for example, failure to isolate a known pathogen such as *Hæmophilus influenzæ* or a pneumococcus from purulent sputum may mean that antibiotic therapy is unjustifiably withheld. The results are poor when unsuitable cases are treated, when an inappropriate antibiotic is chosen, and when other measures, such as postural coughing in patients with copious sputum, are neglected. However, in our view, inadequate initial dosage is the comonest cause of unsatisfactory results.

While it would be tedious to review all the published studies from Britain, Scandinavia and latterly the United States of America, it seems worthwhile to record our own practice, which is largely based on these studies, although modified to some extent by our own observations (Gandevia and Cowling, 1961). Briefly, the bacteriological findings in our series of 17 patients followed for over 16 months indicate the importance of *H. influenzæ* and pneumococci, and also suggest that coliform organisms, and perhaps other bacteria, may be pathogenic in certain circumstances.

The present discussion is confined to long-term chemotherapy, which is required for only a minority of patients with chronic bronchitis in this country, because the antibiotic therapy of acute exacerbations is identical except in regard to its duration. For the efficient management of exacerbations, treatment should continue for a few days after the maximum improvement in sputum volume and purulence has been achieved (this virtually means a minimum course of five days, often up to ten).

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Selection of Patients for Long-Term Chemotherapy.

Considerable clinical and subjective benefit, with improved well-being and appetite and gain in weight, may be expected only in patients with persistently and frankly purulent sputum in amounts exceeding 2 to 3 oz. per day. Patients with mucoid or mildly mucopurulent sputum, irrespective of quantity, show no obvious benefit and long-term chemotherapy is not indicated. Patients intermediate between these groups, with moderately purulent sputum and periodic exacerbations associated with frankly purulent sputum, warrant a trial of long-term chemotherapy if relapse occurs within a month of a week's intensive antibiotic treatment. If the sputum purulence is not easily controlled, the treatment is not well tolerated or there is no subjective improvement, it may be discontinued. In these or less severe cases, intermittent chemotherapy for exacerbations or threatened exacerbations is preferred.

There is a small but most impressive group of patients in whom effective initial control, followed by several months of maintenance dosage (usually until the ensuing summer), produces months of subsequent freedom from purulent or even mucopurulent sputum. The mere existence of this group, small though it is, justifies a long-term trial of antibiotics in many cases.

A woman, aged 60 years, complained of severe cough and the production of 4 oz. of purulent sputum daily for two years, with little previous history suggestive of bronchitis. Her constant loose cough was a source of intense embarrassment to her, so that she dreaded going out in public, or even visiting her friends. In the previous 18 months she had had several courses of penicillin, administered both orally and intramuscularly, and of tetracycline, without benefit. After six days of therapy with penicillin and streptomycin in large doses (see below) the sputum was mucoid. Although it may be that this course would have sufficed, tetracycline therapy was continued throughout the next winter because of the previous severity of the bronchitis and the degree to which it had affected her life. She has remained free from exacerbations, with only trivial cough and mucoid sputum, for 12 months since the drug was stopped in the following summer and has led a full and active life since treatment began. Whilst the duration of symptoms was relatively short in this case, two other patients with longer histories of persistent cough and purulent sputum have followed a similar course.

Antibiotic therapy produces little improvement in exercise tolerance in those whose associated obstructive lung disease is disabling, although there are some exceptions. Occasionally the sputum becomes more tenacious, and wheezing and dyspnœa are therefore worse. This is usually transient and can be controlled by steam inhalations and by large doses of potassium iodide and bronchodilator drugs. In severely emphysematous and disabled patients with only a little mucopurulent sputum, antibiotics seem to be of no help except for frank infective exacerbations. It is tempting to give long-term antibiotic therapy in the hope of minimizing progressive lung damage; there is no published evidence that it does so, and the results in our experience are unimpressive.

Apparently mucopurulent sputum in wheezing patients frequently contains only eosinophil leucocytes and few or no polymorphs. Antibiotics are valueless in these cases. Conversely, patients regarded as primarily asthmatic are sometimes found to have polymorphs predominating in the sputum and they may therefore benefit from antibiotics. One of us has noticed this on several occasions in children, in whom a distinction between asthma and infective bronchitis is not always easily made.

We have repeatedly confirmed the observation of others that the patient's account of sputum colour is unreliable; it is obligatory to inspect a specimen personally. It is a popular fallacy that "white" sputum is mucoid sputum; it is often pure pus.

Choice of Antibiotics.

In patients with severe chronic bronchitis and persistently purulent sputum, *H. influenzæ* is almost always present; *Streptococcus pneumoniæ* and a number of other organisms may be associated with exacerbations in severe or mild cases. Sputum cultures which do not reveal one or more recognized pathogens are not sufficient indication for the withholding of antibiotic therapy. Indeed, the condition may be effectively managed empirically without sputum culture, although a culture obtained prior to treatment is desirable, mainly to exclude the presence of resistant organisms or less common pathogens such as *Staphylococcus pyogenes*.

Penicillin is effective only to the extent that it eliminates *Strep. pneumoniæ*, and it therefore sometimes renders the sputum mucoid in patients who have mild bronchitis with occasional exacerbations. In these cases the sputum usually remains mucoid for weeks or months after a short course of treatment (May, 1955) until reinfection occurs. Large oral doses of penicillin V (500 mg. five times daily) have been advocated to ensure a reasonably high concentration in the respiratory tract—perhaps high enough to influence other less sensitive bacteria. Intramuscular administration of penicillin, in full doses, may be preferred because of the lower incidence of side-effects.

H. influenzæ, the more common and the more important pathogen in severe cases, is usually insensitive or relatively insensitive to penicillin,[2] and even if sensitive *in vitro* it is usually not eradicated by penicillin alone. It can be generally assumed that *H. influenzæ* will be sensitive to the tetracyclines and to chloramphenicol,[3] but again in order to achieve effective concentrations in the bronchial secretions large doses, such as 3 grammes of tetracycline (2 grammes daily in small subjects), are required. There is some evidence from in-vitro sensitivity tests that chloramphenicol is the most active antibiotic against *H. influenzæ* (Zinnemann, 1953; Franklin and Garrod, 1953) and this is in accord with clinical impression. However, it is precisely those patients with severe purulent bronchitis, in whom it would be of most use, who are most likely to require repeated or prolonged courses. The risk of aplastic anæmia is great enough to restrict the use of this drug to patients in whom initial control of purulent sputum cannot be achieved by other means.

For the initial control of purulent sputum two simple and safe regimens are available: crystalline penicillin (4 to 6 million units) with streptomycin (2 grammes daily divided into four doses) or one of the tetracyclines (in practice "Achromycin" or "Achromycin V"[4], 3 grammes daily given in three or four doses). The former routine often effects speedy control, but a recent chest radiograph and perhaps sputum microscopy are needed to exclude associated tuberculosis, and renal function should be reasonable. With either method (after a maximum of five days with penicillin and streptomycin, and five to seven days in the case of "Achromycin") a change is made to "Achromycin" (2 grammes daily); this is reduced gradually until a dose is found which maintains the sputum mucoid or at a minimal degree of purulence. This dose lies between 0·75 gramme and 1·5 grammes daily and is commonly about 1 gramme. Any tendency to relapse, as judged by sputum colour, or the onset of a "cold", is immediately countered by increasing the dose to 2 to 3 grammes daily, reducing it gradually after 48 to 72 hours. After either regimen, *H. influenzæ* may still occasionally be cultured from the sputum.

Side-effects are little more common with the larger dosages. "Diarrhœa" from tetracycline can usually be controlled with kaolin or similar preparations; it is usually transient or else the patient becomes adjusted to two or three motions per day. Sometimes oxytetracycline is tolerated when tetracycline is not, and vice versa (May and Oswald, 1956). In the absence of renal damage, toxic effects with streptomycin (2 grammes daily) have not been observed, provided the course has not lasted more than five days.

[2] Four out of 54 strains isolated from our patients were sensitive.

[3] Seventy-five out of 76 strains isolated from our patients were sensitive to both antibiotics.

[4] Our experience with "Ledermycin", though limited to date, suggests that lower doses of this drug may suffice.

A man, aged 58 years, with severe chronic bronchitis and some bronchiectasis, had for many years coughed up 8 oz. of pure pus daily, with the aid of postural coughing. On three attempts over three months he was unable to tolerate "Achromycin" or "Achromycin V" in full doses for more than a few days, nor on a subsequent trial could he take "Terramycin". The sputum was more than halved in amount, though it remained moderately purulent, after five days of chloramphenicol therapy. He was able thereafter to take 1 gramme of "Achromycin" daily without any gastro-intestinal disturbance. His general appearance and attitude to life improved greatly; his appetite returned and he gained weight. His condition has since stayed the same for two years. No further improvement was obtained when he was admitted to hospital and given full doses of penicillin and streptomycin, or when he was given novobiocin in addition to his maintenance dose of tetracycline.

For maintenance therapy tetracycline is preferred to orally given penicillin, sulphonamides or penicillin-sulphonamide combinations. Some recent trials claiming superiority of one or other of the latter are open to criticism on the grounds that the tetracycline dosage was too low (0·5 gramme daily), that the dose of all chemotherapeutic agents was constant and not adjusted to the individual's response and—most important—that no emphasis was laid on initial control of infection by high dosage. If long-term chemotherapy is to be undertaken in selected cases, then nothing less than the maximum possible improvement for the individual should be aimed at; this is not possible in most cases without massive chemotherapy in the initial phase.

We are not prepared to use commercial preparations of two antibiotics, each as a rule in suboptimal dosage, until these have been shown by others to be safe and at least as effective as tetracycline alone. For this reason our experience with other antibiotics and with combinations of them is small. The use of nystatin with tetracycline sometimes, but not always, obviates some of the unpleasant side-effects of tetracycline alone. The addition of novobiocin to the maintenance dose of tetracycline (the commercial combination contains only 125 mg. of tetracycline) has not improved the state of the sputum in two severe cases of chronic bronchitis and one of bronchiectasis. There is no justification for the use of erythromycin; *H. influenzæ* is frequently resistant, and in any case this drug should be held in reserve for the management of staphylococcal infections resistant to the common antibiotics. This applies with particular force in the present situation because the development of resistant staphylococci is a potential risk in the long-term treatment of bronchitic patients with tetracycline. We know of no instance of complications attributable to this cause, but the possibility should be borne in mind, especially in the treatment of staphylococcal infections in the families of patients on long-term tetracycline therapy.

Summary.

1. The antibiotic therapy of chronic bronchitis is discussed with special reference to the selection of patients and of antibiotics, and with emphasis on the need to achieve maximum improvement in sputum characteristics in the initial phase of treatment.

2. Initial control of purulent sputum in chronic bronchitis or its exacerbations is best obtained with massive doses of penicillin and streptomycin, or of tetracycline; maintenance therapy is continued with tetracycline in appropriate cases.

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REOVIRUS — A UBIQUITOUS ORPHAN.[1]

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VIROLOGY today appears to be emphasizing several important biological problems, namely: (i) the very large number of viruses now known to infect man, animals, plants and insects; (ii) the ecological, epidemiological, public health and host-parasite relationship problems consequent upon this; (iii) the use of virus as a tool in the study of genetics, the properties of desoxyribonucleic acid

[1] Based on a lecture delivered at the University of Adelaide on June 7, 1961.

and ribonucleic acid and protein synthesis; (iv) the production of tumours by viruses.

Confusion rather than order has arisen from the recent demonstration that hundreds of antigenically distinct viruses infect man and may be capable of causing disease. The difficulties are appreciated as much by the physician and the general practitioner as by the academic virologist. The diagnostic and epidemiological problems associated with the observations that one virus can cause several distinct clinical syndromes and that one clinical syndrome can be caused by many viruses are gradually being resolved, and one important factor in their resolution is the cooperative study by the general practitioner and the virus laboratory. This cooperation is, unfortunately, only too rare.

A discussion of the properties of reoviruses will serve to illustrate some of the problems referred to above. "Reovirus" was proposed by Sabin in 1959 as a group name for a number of viruses formerly designated, or closely related to, ECHO type 10. It was subsequently shown that reovirus was identical with a virus (HEV) which was isolated in Sydney in 1951 (Stanley *et alii*, 1953, 1954; Stanley, 1961). Before a discussion of the implications of these recent investigations, a brief outline of pertinent aspects of the current situation with the enteroviruses would be helpful.

Members of the enterovirus group are infective agents commonly isolated from the intestinal flora of men, monkeys, cattle, swine and some other animals. The human strains, comprising about 60 antigenic types (Figure I), are similar in size, resistance to ether, cytopathogenic effect, seasonal incidence, epidemiological pattern and disease spectrum. It is now reasonably certain that the enterovirus enters the body via the oropharynx and that the primary site of multiplication is the intestinal tract. Consequently fæces is the vehicle of excretion and spread. The most common clinical features of enterovirus infection appear to be (i) inapparent infection and (ii) a mild, febrile illness sometimes associated with gastro-intestinal disturbances. However, the possible clinical pictures and diseases are several. Thus the poliovirus may cause aseptic meningitis, a summer febrile illness or paralysis. Viruses of Coxsackie Group A may cause aseptic meningitis, a summer febrile illness, paralysis, herpangina or a rash. Viruses of Coxsackie Group B may cause aseptic meningitis, a summer febrile illness, paralysis, pleurodynia or neonatal myocarditis. ECHO viruses may cause aseptic meningitis, a summer febrile illness, paralysis, rash or summer diarrhœa. It will be noticed that aseptic meningitis, febrile illnesses and paralysis are common to all four groups, but paralysis is more frequently observed with poliovirus infections than with other enterovirus infections. The isolation and identification of all the enteroviruses is performed as a routine in most virus diagnostic laboratories.

While we were investigating the properties of Coxsackie viruses and polioviruses in Sydney about 10 years ago, an infective agent was isolated from the fæces of an aboriginal child diagnosed as having bronchopneumonia and who later developed alopecia areata and conjunctivitis. Further work on this virus, to which the name HEV was given, revealed the following properties: (i) The production of clinically recognizable disease in suckling mice only. The common observations were oily hair, jaundice, peritoneal exudate, ataxia, tremors and paralysis, retardation of growth (Figure II), the prolific production of fæces with a fat content nine times as much as normal, conjunctivitis and alopecia (Figure II) (less common and delayed). (ii) Histopathological lesions were observed in the brain, cord, liver, heart, spleen and lungs. (iii) Membranes of 110 mμ A.P.D. withheld virus, but membranes of 130 mμ A.P.D. did not. (iv) HEV is resistant to ether and more resistant than most viruses to heat, formalin and lysol. (v) HEV grew in chick embryos and in monkey kidney tissue cultures.

It was found that the continued passage of HEV in the central nervous system of suckling mice, in monkey kidney tissue culture or on the chorio-allantoic membrane of chick embryos selected a neurotropic variant which paralysed the mice and killed them in five days without jaundice and oily hair. The agent could be maintained in its original form by oral passage from litter to litter or merely by contact. The patient from whom the agent was isolated developed neutralizing and complement-fixing antibodies, as did experimentally infected monkeys. The monkeys were symptomless. There was no evidence of the virus being latent in the mouse stock.

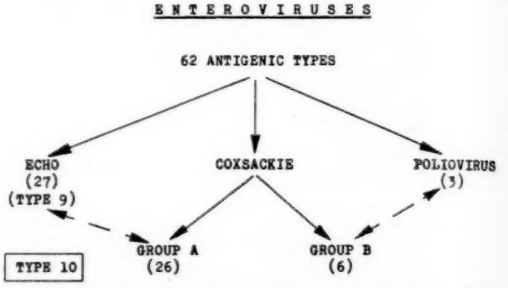

FIGURE I: Antigenic classification of enteroviruses. Type 10 stains have been removed and are now known as reoviruses (Sabin, 1959).

In 1954 HEV was shown to be quite distinct from the virus of infective hepatitis, the mouse hepatitis virus of Gledhill, herpes simplex and Theiler's encephalomyelitis virus.

FIGURE II: Litter mates aged 26 days. The mouse on the left of the photograph shows retardation of growth and alopecia following infection with reovirus type 3.

Agents which are claimed to be identical with HEV have been isolated in Holland (van Tongeren, 1957) from human fæces, in a familial infection; in India from mice (Work, 1957); and in the United States of America from the fæces of a patient with cerebellar ataxia and from the brain and cord in a fatal case of disseminated encephalomyelitis (Krainer and Aronson, 1959).

These then were the known properties of the virus recently shown to be identical with the reoviruses (Stanley,

1961). Sabin's classification of a new group of respiratory and enteric viruses, formerly classified as ECHO type 10, as reoviruses is certainly apt and justified in the light of recent findings.

The inclusion of ECHO type 10 strains in the ECHO group was originally based on their origin from human stools, their isolation and growth in monkey kidney tissue cultures and the lack of pathogenicity of the initial strains for laboratory animals. A closer examination of ECHO type 10 strains revealed definite differences from all other ECHO and enteroviruses. The obvious major difference was one of size—75 mμ as opposed to 18 mμ for the enteroviruses (Sabin, 1957). ECHO 10 strains produced a distinct cytopathogenic effect in monkey kidney tissue cultures and a wider tissue-culture host range (Hsuing, 1958). Variants were eventually obtained that were pathogenic for infant mice and produced lesions in the brain, heart and liver (Dalldorf, 1957). The hæmagglutination of human group O erythrocytes by ECHO type 10 viruses was inhibited by very low concentrations of potassium periodate. This red-cell receptor destruction was not observed with other ECHO types. Sabin intended the name reovirus to stress the association of this group of viruses with both the respiratory and enteric tracts.

It is suggested that the original HEV isolated in Sydney is the prototype strain of reovirus type 3. A reexamination of reovirus strains has now shown that all three antigenic types are pathogenic for suckling mice and produce the oily hair effect and alopecia. These recent studies have helped to define the nature and properties of this group of infective agents and these are briefly summarized.

Nature and Properties of Reoviruses.

Physical Properties.

The size of reoviruses is approximately 72 mμ as measured by a filtration technique. They are slightly smaller than the myxoviruses and the adenoviruses; they are considerably larger than the enteroviruses. They are ether-resistant, as are enteroviruses and adenoviruses, and in our experience they are greatly resistant to physical and chemical agents—for example, they survive 56° C. for two hours, 60° C. for half an hour, and a 2% solution of lysol, a 0·25% solution of formaldehyde and a 0·25% solution of phenol for one hour at 22° C.

Hæmagglutination.

Nearly all strains produce a hæmagglutinin for human group O erythrocytes, but not for bovine, fowl, guinea-pig or sheep erythrocytes. The red-cell receptors are not affected by the RDE of *Vibrio choleræ*, but are destroyed by very low concentrations of potassium periodate (1:6000) (Sabin, 1959).

Antigenic Types.

All strains so far isolated fall into three antigenic types which may be distinguished by hæmagglutination-inhibition or neutralization tests (Rosen, 1960). All strains so far possess a common complement-fixing antigen. Some of the simian viruses (SV agents) described by Hull *et alii* (1958) fall into types 1 and 2. The original HEV is type 3. It is worthy of note that other viruses (for example, enteroviruses and adenovirus) associated with widespread and usually inapparent infection of man may be divided roughly into two groups, depending on the numbers of antigenic types determined, as follows: those having a limited number of types, such as the poliovirus (3) or the reovirus (3); those having numerous types, such as the Coxsackie (30+) or ECHO (28+) viruses. Poliovirus and reovirus, both with three antigenic types, are also similar in that the highest incidence of infection occurs in young children.

Cytopathogenic Effect.

In monkey kidney tissue culture there is a distinctive change which takes some days to appear. The cells may separate from the sheet and assume a granular appearance with intact nuclei. In stained preparations cytoplasmic inclusions are usually observed (Sabin, 1959).

Growth in Suckling Mice and Chick Embryos.

Reference has been made to the oily hair effect, jaundice, peritoneal exudate and so on that characterize infection of suckling mice with some strains. Not all strains produce clinical signs of infection in suckling mice and of those producing illness not all produce the oily hair effect and jaundice. One suggestion to explain the latter finding is the selection of neurotropic variants during passage (Stanley *et alii*, 1954; Stanley, 1961). Selection of these is favoured by tissue-culture passage and passage of infected chorio-allantoic membranes of chick embryos. As most strains of reovirus isolated in laboratories of the United States of America were primarily demonstrated in monkey kidney tissue culture, this may account for the fact that such strains rarely produced the clinical syndrome of the hepatotropic variant.

TABLE I.

Relationship of Antigenic Type of Reovirus to Isolation Source.

Source.	Antigenic Type.	Reference.
Fæces of healthy children ..	1, 2 and 3	Huebner, 1960; Rosen, 1960; Ferris, 1961.
Cattle	1, 2 and 3	Rosen and Abinanti, 1960.
U.R.T.I. in children	1, 2 and 3	Ferris, 1961.
Outbreak of mild febrile illness in children (fæces and throat)	1	Rosen *et alii*, 1960.
Two outbreaks of febrile U.R.T.I. with diarrhœa in children (fæces and throat).	3	Rosen *et alii*, 1960.
Epidemic rhinitis in chimpanzees	2	Sabin, 1959.
Monkey kidney tissue culture (SV12)	1	Hull *et alii*, 1958.
Fatal pneumonia in a monkey (SV59)	2	Hull *et alii*, 1958.
Diarrhœa in children	2 and 3	Sabin, 1959; Rosen *et alii*, 1960.
Steatorrhœa in children ..	2 and 3	Sabin, 1959; Stanley, 1961.
Pneumonia in a child ..	3	Stanley, 1961.
Mice	3	Work, 1957; Rosen, 1960.

Ubiquity and Clinical Illness in Man.

Table I shows the source of isolation of strains in relation to antigenic type. Of 34 strains isolated by Ferris in Melbourne by the inoculation of monkey kidney tissue culture with fæces suspensions, six were type 1, 24 were type 2 and four were type 3 (Ferris, personal communication). The majority of strains were isolated from infants during a crèche survey. To these findings should be added Dr. Huebner's (1960) observation that "virtually every domestic animal as well as man experiences infection with all three serotypes". It will therefore be of considerable interest to study the natural history of the spread of reoviruses.

They would appear to be one of the most ubiquitous groups of viruses so far studied. This very ubiquity complicates the picture if we are to associate them with clinical illness. Infection readily spreads amongst humans and apparently in monkeys and chimpanzees in contact with man. The excellent opportunities for humans to spread reoviruses to some other species too (for example, cattle and mice) would seem to make infection in man the basic cycle on which the natural history of reoviruses might depend.

The problem in relation to steatorrhœa is unresolved, but is being investigated. Three strains have been isolated from seven cases, one of fibrocystic disease of the pancreas. The clinical picture in mice is usually one of steatorrhœa. On one occasion infected mice developed interstitial and parenchymal pancreatitis with intact islets of Langerhans (Eggers and Sabin, 1960). It is quite obvious that both in the United States of America and Australia by far the largest number of isolations have been made from infants (see Table I). In this regard investigations of "epi-

demic steatorrhœa" by Thomas (Thomas, 1952; Thomas and Charter, 1956) may be pertinent. Thomas's description of the 1952 outbreak in a day nursery indicates that an infective agent is almost certainly involved. This could not be shown to be caused by bacteria and a virus ætiology was suggested.

Comparison with Adenoviruses.

It appears that reoviruses are more closely related to adenoviruses than to enteroviruses. Table II illustrates some of the properties of reoviruses and adenoviruses.

TABLE II.

Comparison of Some Properties of Reoviruses and Adenoviruses.

Property.	Reovirus.	Adenovirus.	Reference.
Size	About 70 mμ.	Slightly larger[1] than 70 mμ.	
Ether resistance ..	Resistant.	Resistant.	
Infection of man	Respiratory and G.-I. tract.	Respiratory and G.-I. tract.	
Hæmagglutination	Mammalian cells (human group O only).	Mammalian cells (several species).	
Diarrhœa in man	+	+ (type 7)	Gardner *et alii*, 1960.
Infection in S.M.	+	− ?	Hartley and Rowe, 1960.
Inapparent infection.	+	+	
Tissue culture ..	Delayed cytopathogenic effect and cytoplasmic inclusions.	Delayed cytopathogenic effect and intranuclear inclusions.	
Isolation from cattle and mice.	+	??	Klein *et alii*, 1959.

[1] Considerable variations in size are recorded for adenoviruses, depending to some extent on the methods of purification and the source of material.

Conclusions.

A consideration of the known properties of reoviruses suggests a fertile field for further study aimed primarily at elucidating the natural history of reovirus infection. In particular our present studies involve five problems: (i) the nature of the hæmagglutination of human group O erythrocytes and the destruction of the red-cell receptors by low concentrations of periodate; (ii) genetics of reoviruses with such markers as mouse-virulence, hæmagglutinin, chorio-allantoic membrane lesions and cytopathogenic effect in tissue culture; (iii) the association of reovirus with some forms of steatorrhœa in man; (iv) the distribution of antibodies in man and other vertebrates; (v) the identification and properties of the nucleic acid component.

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THE INFLUENCE OF MODERN FOOTWEAR ON FOOT DISABILITIES.[1]

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THE human foot has been described by Stamm as "a beautifully designed piece of mechanism which, unless affected by disease or injury, should give a lifetime of trouble-free service, carrying its owner a quarter of a million miles in the process". This is a better performance than one can expect of any motor-car, and, in our present aging population, the feet are required for a much longer period of time, and therefore require very special attention.

Before one considers the present problem it is necessary to understand the mechanism of the healthy foot and its coverings, as well as the postural complex. The foot is merely one unit of the locomotor system helping to maintain the human being in the upright position; nevertheless it has assumed considerable importance because it is the keystone of the mechanism, and upon its integrity depends the comfort or otherwise of the individual.

Mechanism.

Let us look briefly at the anatomy of the foot and its mechanism. It is primarily a machine based on the principle of a lever, which allows us to propel ourselves forward when walking, running or jumping. The long

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on April 27, 1961.

arch forms the lever, pivoting about a fulcrum which is formed by the heads of the metatarsal bones. The power to move the leg is provided by the calf muscles acting through the tendo Achillis, but we also use it as a pedestal to stand on, and since the ideals of a good pedestal are different from those of an active and powerful machine, the foot has to be a compromise between the two. A flat and supple foot will always be able to distribute its weight evenly over its under surface, and there will therefore be no undue pressure on any part of it or on its ligaments.

The apparent flatness of the feet of the Maoris, the African natives and the Australian aborigines in the standing position is very exaggerated, but when one watches them performing their native dances, one finds that the supple nature of their feet allows them to adjust to active movements without difficulty. Because the foot is composed of a number of bones with joints between them, the only way it can be made to support the body weight is by the bridge of the longitudinal arch, and as this is present only on the inner side of the foot, it resembles a half-dome. When the two feet are placed together they form a complete dome. When the feet are separated they have the natural tendency to topple inwards. This is prevented by the tone of the muscles when they are intact. If the structures of the longitudinal arch are constantly irritated by exaggerated positions in the shoe, they tend to shorten in the position in which they continually find themselves and their weight-bearing qualities deteriorate.

Gait.

Normal gait consists of the swing phase and the propulsion phase. The ground phase follows the swing of the leg and begins when the heel touches the ground; it is followed by the head of the fifth metatarsal bone, the head of the first metatarsal bone and then the great toe. Normal gait involves many structures of the body far removed from the feet.

Good Posture.

"Good posture is the one least likely to lead to fatigue or strain"; in this happy state the joints will be held in a position of balance and never in an extreme position, and there will then be no tension on any ligament. With the body in a state of balance the minimum amount of work will be required of the muscles to maintain it.

Requirements of Satisfactory Shoes.

Before considering the disabilities caused by modern shoes, let us consider the components and the requirements of satisfactory shoes, and the scientific work available to prove that the modern shoe does not meet these requirements and why.

Practising as I do in the fields of rehumatic disease and rehabilitation, I have many opportunities of observing foot disabilities and poor posture; it has caused me to interest myself in the underlying cause and to wonder why women are so enslaved to fashion that they will endure untold pain and misery, with resultant severe foot disabilities, just to look like the other women.

Valuable scientific work has been done on the influence of heel height and shank curvature on the osteoarticular relationships of the normal foot in women, and also on the type of shoe worn by members of the armed forces in the United States of America. There have also been studies on the types of shoe suitable for growing children.

It is generally agreed that the shoes now available for children are scientifically designed and made in a sufficient number of fractional fittings to cover feet of all ages, so that all is well while they are under parental supervision; the trouble begins when they become old enough to choose shoes for themselves and are too fashion-conscious. Mostly, men's shoes conform to accepted standards, and are well made, with the features required to prevent foot disabilities. Women's shoes have always been a problem, but since the advent of stiletto heels for wear in the evenings with the abrupt change from loose "flatties" in the daytime, the complaints of painful, swollen feet, backache and postural strain, with the complications of increased nervous tension and family strife, have shown a considerable increase. One wonders how long the interests of the shoe trade are to dominate the comfort and welfare of the population.

What are the requirements of satisfactory shoes? They serve three purposes — support, protection and appearance, the design of any particular shoe being dependent upon the relative importance of function as opposed to appearance in each case. So far as function is concerned, the essential features of a good shoe, whether for a man, woman or child, are described below.

Heel.

Most shoes have a heel because it has been found to be more comfortable by the majority of people.

Shank.

It then becomes necessary to bridge the gap between the heel and the point where the foot again makes contact with the ground at the level of the ball of the foot; this part of the shoe is known as the shank. This area should be sufficiently strong not to collapse gradually under the load, but should retain a certain amount of resilience; this is one of the most difficult problems of manufacture. Steel is used for this purpose, and in cheap shoes it is not possible to have the best quality material.

Sole.

The sole proper starts from the point where the shank meets the ground—and it is at the junction of the shank and the sole that flexibility should occur, for this area coincides with the line of the toe joints; it should provide a firm base for the toe to press upon, and it should be quite flat from side to side.

Uppers.

The uppers of a shoe should fit closely around the heel and instep, so as to avoid friction and prevent the foot from sliding forward in the shoe. This is comparatively easy with a lace-up shoe or with an instep strap; however, a court shoe can be held in position only by the accurate cut and fit of its upper edge.

Workmanship.

The best quality of workmanship and materials should be used; the back part of the shoe should fit the heel and instep closely, and the fore part must give adequate room in length and breadth to allow the toes to move freely.

Appearance.

The final feature of a good shoe is that it should look smart.

Investigations.

In a search for arguments against the style of modern footwear the following scientific works were perused.

The work of Schwartz and Heath (1959) was designed to discover the influence of heel height and empirical shank curvature on osteoarticular relationships in the normal foot. Their findings and pictures make an interesting contribution to the subject.

Their conclusions were drawn from a series of 65 X-ray studies of the feet of two female subjects in the lateral position with normal feet under carefully controlled conditions. The feet were studied in positions of increasing heel elevation with and without shoes, and under the influence of different shank curvatures found in shoes of different heel heights.

Careful measurements were made from this study of 65 lateral X-ray films, and these measurements strongly suggest that (i) the length of the foot to the metatarsal head does not change significantly as heel height is increased; (ii) the heel-to-ball length of the bare foot

may or may not shorten slightly when the subject stands with the heel raised either actively or passively; (iii) the shortening of the heel-to-ball length of the foot when shoes are worn may increase to twice that observed in the bare foot; (iv) this shortening occurs in association with elevation of the longitudinal arch of the foot by the shoe shank accompanied by a hinging of the foot at the cuneo-navicular and talo-navicular joints.

The response of normal feet to various heel heights, shank curvature and heel-to-ball relationships should be precisely determined on a mathematical basis. Shoe lasts and shoe shanks should be designed to conform to the relationship found to be required by each individual foot at various heel heights.

This study was designed to contribute to the general knowledge and understanding of the function of the human foot and therefore its functional needs.

Since footwear profoundly affects the continuing well-being of the foot, it is vitally important that the shoe last be designed to meet, in the fullest measure possible, the requirements of the foot in action. The general belief that feet function somewhat differently in shoes of different heel heights from the way they do when bare seems to have been supported.

Karpovich and Wilklow (1959) did a goniometric study of the foot in standing and walking. The objective of the study was to investigate changes in the amount of pronation and supination of the foot under various conditions (during standing and during walking). Very special and accurate measuring devices were designed, and college students with normal feet were used for the experiment. In the graph there were two phases in walking, one shallow—the air phase, during which the foot is carried through the air—and the other a deep one corresponding to the ground phase. The air phase in this series occupies 0·44 second and the ground phase 0·74 second; pronation is increased during the whole of the ground phase.

The ground phase begins with the heel touching the ground; 0·05 second later, the head of the fifth metatarsal bone, and 0·47 second later the great toe, touch the ground—thus the sequence is heel, head of fifth metatarsal, head of first metatarsal, great toe. The variations for the right foot were found to be greater than for the left foot, and the amount of pronation was greater in the right foot than in the left; also walking with the toes turned inwards decreased pronation, while walking with the toes turned outwards increased it. One of the factors contributing to foot discomfort is excessive pronation; therefore the correct position of the feet in walking would appear to be with the toes turned in, not out, or parallel.

The results of these studies would lead us to the conclusion that, unless the anatomy of each individual foot is considered before shoe fitting is undertaken, many disabilities can arise from faulty mass production of all areas of the shoe, especially the shank.

The most productive cause of trouble is the inward roll, with the toe out and eversion of the sole; this not only leads to disability of the foot, but has been shown by Lawrence Jones in his monograph "The Postural Complex", to extend to the whole of the lower extremities and pelvis, because of the synchronization of movement in the weight-bearing lower extremities involving all the segments. Any rotary movement of any one segment is transmitted, in standing or weight-bearing, to the entire structure.

In a consideration of human gait, the following basic conclusions are important, because one realizes that we start at a disadvantage; if this is increased by poorly styled shoes we must develop disabilities. (i) Human gait is basically unstable, in that we stand on two feet, but walk on one—one foot at a time. (ii) The foot is an exceedingly small off-centre base for a very large superstructure—the body. (iii) With the complete alternation of bipedal gait at the instant of full weight-bearing, full body weight is directed to the inside border of the foot. (iv) Inward roll of the foot and leg is the natural consequence. (v) Faults in good posture in varying degrees are almost universal.

Modern Shoes.

With these basic difficulties to overcome, it is therefore essential to study the individual requirements of every foot and design a shoe accordingly. Knowing the cost of individually designed shoes, one wonders how the problem could be overcome.

Where do modern shoes fail to satisfy these requirements?

It has become the fashion to wear court shoes which offer little support, and to have stiletto heels of excessive height, with an extremely arched shank. If the shank is made of good pliable steel it is bad enough, but when the shoes are cheap ones, with poor steel, there is much shortening and constant ligamentous strain. The sudden change to flat shoes at the end of the day is more than the irritated ligaments can endure, and day-by-day trauma thus inflicted has very detrimental long-term effects.

The excessive height of the heel and poor support cause inward roll of the foot, and lead to the alteration of posture, which complicates this picture.

The types of disabilities thus caused and their management are the business of the orthopædic surgeon; however, their prevention is the important problem.

From inquiries I find that the excessively pointed toe and stiletto heel are losing favour in the United States of America, where a broader, less exaggerated heel is now shown with a chisel toe.

Since commencing this study I have watched many hundreds of feet as I have travelled around the world and the points emphasized are only too obvious. At present no matter where one inquires, whether in the United States of America, Canada, Great Britain, Europe, Africa or Australia, it is quite impossible to purchase a dress shoe free of the Italian influence of the excessively pointed toe and thin heel. To my astonishment last year I found that even in the shops of a very conservative city—namely, Edinburgh—fashion had outweighed common sense and no smart shoes were obtainable possessing the qualities previously enumerated.

Golf shoes and nurses' shoes possess these qualities, but these have limited appeal and function, especially to the young and fashion-conscious. It is to this age group that our theme song should be sung.

According to recent statistics young people are destined to require their feet for 15 to 20 years longer than did their grandparents; therefore it is our duty to become more foot conscious, and to observe the gait of our patients and the type of shoes they wear. We should try to relate these to their constant complaints of fatigue, the fashionable symptom of nervous tension, and their general inability to adjust themselves to the demands of modern living. Herein lies the frequently missed ætiology of many of these minor complaints, which take up hours of the busy doctor's time in the elucidation of their cause.

I hope that sufficient seeds have been sown to stimulate some thinking along these lines. Perhaps contact with the shoe manufacturers to urge them to consider the future of our women, especially if the present fashion trend is to continue, would help to establish a fashion based on more rational scientific principles.

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DESERPIDINE: A CONTROLLED TRIAL OF A RAUWOLFIA ALKALOID.

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CLINICAL EXPERIENCE has shown that the use of reserpine is associated with a comparatively high incidence of side-effects (Comment, 1957; Krogsgaard, 1958; Ford and Moyer, 1958; Quetsch *et alii*, 1959). The most serious of these is mental depression, but lethargy, dreams, sleep disturbances, nasal congestion and diarrhœa may be troublesome. Many patients tend to put on weight when taking reserpine, and some notice an actual increase in appetite. The symptoms are largely subjective, so that it is not easy to assess them accurately, and their reported incidence varies greatly.

An increasing number of other alkaloids of *Rauwolfia* is becoming available, including rescinnamine, serpentine, deserpidine, 10-methoxy-deserpidine and syrosingopine. Most of these are said to have a satisfactory hypotensive action and to be less likely than reserpine to cause side-effects. The evidence for such claims is often scanty, and few controlled clinical trials of these drugs have been reported.

In the present paper a double-blind clinical trial is reported of a small series of patients who had all suffered fairly severe side-effects while taking reserpine. The trial was designed to compare the effects of a placebo tablet, reserpine and deserpidine, an alkaloid of *Rauwolfia canescens* isolated by Stoll and Hoffman (1955) and at first named canescine. Its structure was found by Schittler *et alii* (1955) to be 11-des-methoxy reserpine.

Materials and Methods.

Deserpidine and reserpine were made up in identical 0·25 mg. tablets, and placebo tablets of similar appearance were also provided. Each patient took each type of tablet three times a day for eight weeks, with a period of two weeks between courses. The order in which the courses of tablets were given was varied at random, and neither the patients nor I myself were aware of the order. The patients knew that one type of tablet was reserpine, but they did not know that another type was a placebo.

Eighteen patients were selected from a hypertension clinic, the only criteria being that they had experienced fairly severe side-effects while taking reserpine, and that they were willing to cooperate in a double blind study. One patient had to be discarded in the early stages of the trial, because he insisted on stopping his régime of chlorothiazide and pempidine, which he thought were giving him renal pain, and his blood pressure control threafter was so poor that it was not felt justifiable to continue the trial in his case.

The remaining 17 patients (seven men and ten women) were all aged between 40 and 59 years, apart from one, who was aged 32 years. Four patients had at one time had papillœdema and a further six patients had had retinal hæmorrhages or exudates.

Reserpine had usually been given in a dose of 0·25 mg. three times a day, and its administration had in most cases been stopped several months or years before the trial started. In a few cases it was stopped for the purpose of the trial. The main reasons for stopping the drug were mental depression or severe lethargy in 11 cases, marked nasal congestion in two cases, weight increase in three cases and diarrhœa in one case.

The patients attended once a fortnight and at each visit their weight was recorded and their blood pressure was measured in the supine, sitting and standing positions. The dose of ganglion-blocking drug was adjusted if necessary and specific inquiry was made regarding the following symptoms: mental depression, lethargy, daytime somnolence, nocturnal insomnia and early waking, dreams and nightmares, nasal congestion, appetite and bowel action. These symptoms were graded from I to III according to their severity; the trial drug was stopped or the dose reduced if any really serious symptoms appeared.

Treatment with other drugs was continued during the trial. Fourteen patients were taking chlorothiazide, and nine of these were also taking a ganglion-blocking drug. Only three patients were taking the trial drug alone.

The results were analysed before the sealed information about the nature of the tablets was opened. The blood pressure and symptomatic state for each patient were assessed for the fifth to eighth weeks (inclusive) of each course, and were compared with the state of the patient at the beginning of the course. In the few cases when a patient failed to complete a course of tablets, the last blood pressure readings taken before the tablets were discontinued were used. The blood pressures analysed below are those recorded with the patient standing; for convenience of calculation, the mean blood pressure for each patient has been used—that is,

$$\frac{\text{systolic} + \text{diastolic}}{2}$$

Body weight was measured at the beginning and end of each course of tablets.

Results.

Sixteen patients completed the trial by taking courses of all three tablets. The seventeenth patient took a course of reserpine without difficulty, but became very upset during her second course of tablets (placebo) because she started to have nightmares and morbid thoughts of wanting to murder her children; she had at that time been taking placebo tablets for five weeks. She refused to take the third course of tablets.

The following results are, therefore, based on the 16 remaining patients.

Symptoms.

Six of these 16 patients also found it necessary to stop taking one of the courses of tablets (Table I) because of troublesome symptoms—for example, mental depression, lethargy, morbid thoughts and so on. This occurred three times during a reserpine course, twice during a placebo course and once during a deserpidine course. No patient found it necessary to stop more than one course of tablets.

TABLE I.
Incidence of Side-Effects in 16 Patients.

Symptom.	Number of Patients.		
	Deserpidine.	Reserpine.	Placebo.
Depression	6	8	5
Fatigue	10	11	10
Somnolence	8	11	7
Dreams	9	11	8
Nasal congestion	13	13	9
Appetite increase	6	7	6
Administration of drug stopped	1	3	2
Dose of drug reduced ..	1	1	0

Insomnia occurred more often during the placebo course (12 out of 16 patients) than during either of the drug courses (7 out of 16 patients in each course), and there is therefore no evidence in this trial to support the contention that insomnia is a side-effect of *Rauwolfia* alkaloids.

The incidence of the other symptoms (Table I) was high even during the period of placebo administration, and differences between the three periods are very small. However, when the severity scores for these symptoms

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are calculated (Table II), it is seen that these scores are in all cases highest for the reserpine periods. The differences are not significant for any one symptom alone, but the total score for all side-effects is significantly higher for reserpine ($\chi^2 = 15{\cdot}65$, $P < 0{\cdot}001$) than would be expected on the hypothesis of similarity between the three different types of tablets. The scores for deserpidine and the placebo on the other hand are almost identical.

Several patients reported a "big improvement" in their symptoms of depression and lethargy when they started the trial tablets after having previously taken reserpine regularly. Three of these were subsequently found to have had reserpine as their first course of tablets in the trial.

TABLE II.
Index of Incidence and Severity of Side-Effects.[1]

Symptom.	Deserpidine.	Reserpine.	Placebo.
Depression	10	13	11
Fatigue	16	21	17
Somnolence	10	19	12
Dreams	12	15	9
Nasal congestion	16	22	11
Appetite increase	7	13	7
All side-effects	71	113	69

[1] Maximum possible score for each side-effect = 48; maximum possible score for all side-effects = 288.

Bowel action was assessed separately and the results are shown in Table III. Nine of the patients were taking ganglion-blocking drugs and allowance had to be made for the laxatives which most of these patients were taking. There was a slightly greater tendency to constipation during the placebo period than during the two drug periods, but there was no difference between reserpine and deserpidine in their effects on bowel action.

TABLE III.
Effect on Bowel Action.

Symptom.	Number of Patients.		
	Deserpidine.	Reserpine.	Placebo.
Diarrhœa	2	3	1
Slight looseness	4	2	2
Normal action	5	4	4
Constipation	5	7	9
Total	16	16	16

Weight.

There was a considerable increase in weight in many patients during the deserpidine and reserpine courses (Table IV), whereas during the placebo course there was a small average loss of weight. The difference between the drug periods and the placebo period was significant ($P < 0{\cdot}001$). There was little difference in this respect between deserpidine and reserpine, although an increase in appetite appeared to be rather more marked during reserpine administration.

Blood Pressure.

A comparison of the effect of the three types of tablet on the mean standing blood pressures (Table V) of the seven patients who were not taking ganglion-blocking drugs showed a definite fall in blood pressure for the group during the reserpine course compared with the placebo course ($P < 0{\cdot}05$), but the differences between reserpine and deserpidine and between deserpidine and the placebo were not significant; however, some hypotensive action of deserpidine was apparent in certain patients.

In the nine patients taking ganglion-blocking drugs the results are more difficult to assess owing to the adjustments which had to be made to the dosage of ganglion-blocking drugs during the various courses. The standing mean blood pressures of these nine patients showed an average fall of 19 mm. of mercury during the reserpine course, and at the same time the dose of ganglion-blocking drug could be reduced by an average of 12%. For deserpidine the equivalent figures are an average blood pressure fall of 7 mm. of mercury and an average reduction in the dose of ganglion-blocking drug of 2%. For the placebo, the equivalent figures are an average blood pressure rise of 7 mm. of mercury and an average increase in the dose of ganglion-blocking drug of 21%. The differences between the placebo on the one hand and each of the two *Rauwolfia* alkaloids on the other are significant ($P < 0{\cdot}01$). The difference between reserpine and deserpidine is not significant ($0{\cdot}1 < P < 0{\cdot}2$); significance at the 1% level ($P < 0{\cdot}01$) would have been observed if the difference between the mean falls in mean blood pressure during the two courses had differed by 24 mm. of mercury instead of 12 mm. of mercury. If the dose of ganglion-blocking drug had not been altered, it is possible that such a difference would have been observed, because the average reduction in dose of ganglion-blocking drug was greater during the reserpine course than during the deserpidine course.

TABLE IV.
Effect on Body Weight.

	Deserpidine.	Reserpine.	Placebo.
Gain in weight	15	11	7
Loss of weight	0	4	8
No change in weight	1	1	1
Mean individual change in weight (lb.)	+3·1	+3·8	−0·8

TABLE V.
Change in Standing Mean Blood Pressure.[1]

	Case.	Change in Blood Pressure (mm. of Mercury).		
		Deserpidine.	Reserpine.	Placebo.
Patients not taking ganglion-blocking drugs.	I	−45	+ 5	− 9
	II	−7	−11	−18
	III	−48	−10	+20
	IV	−15	−4	−15
	V	+26	−30	+15
	VII	+11	−14	+33
	VII	+5	−5	±0
Average change		−10	−9	+9
Patients taking ganglion-blocking drugs. (Percentage change in dosage of ganglion-blocking drugs in parentheses.)	VIII	−8 (+25%)	−43 (−25%)	+15 (+5%)
	IX	−3 (±0%)	+8 (±0%)	+10 (±0%)
	X	0 (+31%)	−35 (−28%)	+10 (+50%)
	XI	−2 (±0%)	−13 (−33%)	+18 (±0%)
	XII	−18 (+20%)	−14 (+6%)	+14 (+15%)
	XIII	−18 (−25%)	−44 (±0%)	−9 (±0%)
	XIV	−14 (−33%)	+17 (±0%)	−8 (+50%)
	XV	+9 (−25%)	−38 (−20%)	+8 (+20%)
	XVI	−10 (−13%)	−11 (−9%)	+4 (+3%)
Average change		−7 (−2%)	−19 (−12%)	+7 (+21%)

[1] Mean blood pressure = $\frac{\text{systolic} + \text{diastolic}}{2}$.

The evidence from both groups of patients indicates that reserpine is a more powerful hypotensive agent than deserpidine in the same dosage. However, even deserpidine shows a significant hypotensive effect when compared with a placebo in patients who are being treated with ganglion-blocking drugs.

Discussion.

The pharmacological effects of deserpidine have been found in general to resemble those of reserpine, both qualitatively and quantitatively (Bein, 1956; Cronheim, 1955; Schneider *et alii*, 1955; Innes *et alii*, 1958). However, clinical reports have suggested that there may be some differences, and in psychiatric patients doses of up to 6 mg. of deserpidine daily have been reported without significant side-effects (Ferguson, 1956). A low incidence of side-effects with a dose of 0·3 to 1 mg. daily has been reported in hypertensive patients (Billow, 1958). On the other hand, a high incidence of side-effects with recanescine (deserpidine) 1 to 3 mg. daily has also been reported in a small series of hypertensive patients (Pepin *et alii*, 1957), and in a comparative study of several *Rauwolfia* alkaloids administered parenterally (Ford *et alii*, 1957), reserpine was found to cause the fewest side-effects in the minimum effective hypotensive dose.

The results of the present small trial suggest that in equal dosage reserpine and deserpidine have an approximately equal effect on weight gain, but that reserpine has a more powerful hypotensive action than deserpidine and is also more liable to cause troublesome symptoms. In both these respects, therefore, a smaller dose of reserpine (for example, 0·25 to 0·5 mg. daily) may be found to be equivalent to the dose of deserpidine used in this trial (0·75 mg. daily), and no striking advantage of deserpidine over reserpine has emerged. However, the trial was not designed to test the possibility that the dose of deserpidine might be increased without increase in side-effects until a satisfactory fall in blood pressure was obtained.

During the trial it was noted that some patients complained of symptoms during reserpine courses, but not during deserpidine courses, and vice versa. It may therefore be worth while trying the effect of deserpidine in individual cases, when even small doses of reserpine have proved to be troublesome.

The high incidence of symptoms in this trial during placebo administration has made interpretation of the subjective results difficult. The patients constituted a selected group, having all had moderate or severe symptoms attributable to reserpine. They were, to some extent, expecting similar symptoms during the trial; this fact and the direct questioning at each visit are no doubt the cause of the high incidence of symptoms even during the placebo courses. It is possible that longer courses would have clarified the position, as reserpine toxicity may not manifest itself for many months, but a prolongation of the trial would almost certainly have made it more difficult to maintain the full cooperation of the patients. There is a possibility that the symptoms noted during the placebo periods were in some cases a consequence of a preceding course of drug; however, this is unlikely, as the assessments were based on the patient's state during the latter half of each course of tablets—that is, a full six weeks after cessation of the preceding type of tablet—but even this time interval may be shorter than is desirable.

The high incidence of symptoms during the placebo period, and the relief from symptoms reported by three patients on starting the first course of trial tablets—which later proved to be reserpine—illustrate vividly the need to carry out trials of new drugs of this type in a double-blind manner, at least when patients' symptoms are being assessed. Reports of relief of symptoms obtained by changing a group of patients from a troublesome drug, such as reserpine, directly to a new and allegedly better one, such as syrosingopine (Bartels, 1959), must inevitably be coloured by the natural optimism of the patients.

Summary.

1. A double-blind clinical trial of deserpidine, reserpine and placebo tablets in hypertensive patients is reported.

2. The hypotensive action of reserpine was more powerful than that of deserpidine.

3. Subjective side-effects were more troublesome with reserpine than with the placebo or with deserpidine in the same dosage.

4. Reserpine and deserpidine caused similar degrees of increase in body weight and looseness of the bowels.

5. It is concluded that deserpidine in a dose of 0·75 mg. daily would show little advantage over a small dose of reserpine (for example, 0·25 to 0·5 mg. daily). The possibility that individual patients may benefit from a change to deserpidine, if even small doses of reserpine are proving troublesome, is not excluded.

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THE NON-INFECTIVE ARTHRITIDES.[1]

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I HAVE been somewhat puzzled about the interpretation which should be placed on the title of this paper, which was chosen by the Organization and Science Committee of the Branch. By "arthritides" I presume is meant the plural of arthritis; the term non-infective poses some problems, as there are four ways in which infection can play a part in joint disease—possibly even five.

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on November 24, 1960.

Firstly one considers a frank infective arthritis—for example, staphylococcal, tuberculous or gonococcal. Secondly, in rheumatic fever there is common agreement that a streptococcal throat infection sets in train a connective-tissue reaction which continues long after the elimination of the initial infection, there being no actual coccal infection of the joints. In Reiter's syndrome there is a non-specific urethritis, sometimes preceded by diarrhœa. Conjunctivitis and arthritis complete the triad. The role of infection in this condition is uncertain and the organism, if any, remains the subject of dispute. Some workers incriminate pleuropneumonia-like organisms, which are regarded as variants of ordinary bacteria—difficult to culture and to handle. This may be an example of a similar mechanism to that seen in rheumatic fever. Thirdly, syphilis may cause a disease of the nervous system which in due course results in the development of the Charcot joint. Fourthly, it used to be held that focal infection played a dominant part in the production of rheumatoid arthritis. While the obligatory search for foci, the removal of teeth, tonsils and gall-bladders and the other excesses of enthusiasm are now brought into perspective, there remain occasional cases in which an infection may play a part in the ætiology or aggravation of what appears to be classical rheumatoid arthritis. For example, Hench (1960) is of the opinion that rheumatoid arthritis precipitated by gonorrhœa may, like true (metastatic) gonorrhœal arthritis, appear from one to four weeks after the onset of genital gonorrhœa, but that it is more symmetrical and more likely to involve the smaller joints than true gonorrhœal arthritis, to produce a synovial fluid which yields nothing on culture and to persist after the genital infection is cured. In a brief review of so-called tuberculous rheumatism, Bremner (1958) discusses the evolution of views of the relationship between tuberculosis and polyarthritis since Poncet first introduced the concept. She reports three cases, in two of which the patients developed tuberculous arthritis in the course of classical rheumatoid arthritis, and in both cases a positive result was obtained from the sheep-cell agglutination test. The third patient, who also gave a positive result to the test, developed tuberculous pleurisy and pulmonary tuberculosis. Apart from such intercurrent infections, opinions are quoted suggesting that very occasionally the tubercle bacillus may play a sensitizing role in the development of polyarthritis, although in the vast majority of cases the association is one of chance or there has been a superinfection of an already diseased joint.

The fifth way in which infection can play a part in arthritis is in the arthralgia associated with infections. It is not always clear whether there is an actual infection of the joints or not; difficulties associated with the culture and identification of many organisms, especially viruses, leave the question unsolved.

It is therefore proposed to limit the discussion to joint conditions in which the role of infection is either non-existent or minor, and further to omit those joint conditions which are essentially degenerative, such as osteoarthritis (often called arthrosis). It is also intended to omit rheumatic fever from consideration.

Rheumatoid Arthritis and Other "Non-infective" Forms.

The preoccupation of both patient and physician with the joint manifestations in cases presenting as "arthritis" tends to divert attention from the polysystemic nature of the malady. The very close study of such cases in the past 25 years has resulted in a much better understanding of the natural history and of the pathology. Radiographic studies are important in that they reflect the natural history of disease and allow the pathological changes to be visualized. Both pathologist and radiographer share the difficulty that connective tissues are capable of only a limited range of reactions to multiple ætiological agents.

The important diseases, in the order of prevalence, are: rheumatoid arthritis and its variants (juvenile rheumatoid arthritis or Still's disease, Felty's syndrome and psoriatic arthritis), ankylosing spondylitis and those forms of so-called collagen disease in which there is a substantial arthritic component. Gout should be mentioned, because it enters so frequently into the differential diagnosis of other forms of arthritis, both clinically and radiologically. There are various rare forms of arthritis whose ætiology is known, such as hæmophilic arthritis, the arthritis of acromegaly and the osteoarthropathy associated with bronchogenic carcinoma.

Collins (1957), in reviewing the pathology of rheumatic disease, has stated that:

> It is a general rule that when an observed pathological change is of a simple, more primitive or basic character, the likelihood is diminished of its being peculiar to any particular disease process or of its indicating a reaction to any specific agent of disease.

This applies to the fibrinoid lesion commonly seen in so-called collagen disease. With regard to the pathology of rheumatoid arthritis, he writes that there is no single histopathological change that will identify it, although it can be defined in terms of the whole pathological picture. The most constant and characteristic lesion is chronic proliferative synovitis. The granulomatous tissue reaction is seen to consist of proliferation of vascular and connective tissue cells, with local accumulation of lymphocytes, plasma cells and leucocytes associated with an exudate often rich in mucopolysaccharides and with necrosis. The association of the exudate and the necrosis constitutes the picture of fibrinoid necrosis. Collins makes reference to the importance of the capillaries and of vascular cells in the production of the fibrinoid focus, with collagen fibril degenerative changes playing a relatively minor role. Kulka (1959), in a report on the pathogenesis of rheumatoid arthritis, emphasizes the importance of vasculitis in the very earliest rheumatoid lesions. Neuberger (1960) states that it is unlikely that changes in collagen synthesis or breakdown are the prime factors in connective tissue disorders. He considers that the study of other components of the ground substance, such as mucopolysaccharides, or of the systemic antibodies could well be of more help in the understanding of connective tissue disease processes. It is known that at least half of the total plasma proteins lie outside the blood vessels, and he quotes evidence to indicate that the larger part of this extravascular fraction is in fact located in the connective tissue. He points out that

> . . . connective tissue contains, apart from fibroblasts, histiocytes, macrophages, mast cells, plasma cells and primitive mesenchymal cells which may according to current opinion be converted into one another, which are believed to be associated in varying degrees with antibody production, and which may also be concerned with the cellular response arising from antigen-antibody combination.

The inference is that the localization of the connective tissue diseases may be due to this coexistence of all the active components within the connective tissue itself.

If one ties cotton waste soaked in petrol on a wooden ladder and lights it, it is probable that the ladder itself will be burned.

Turning now to the ways in which radiography can help in the diagnosis of joint disease, we may consider two concepts. One is like an identity parade. We see a number of pictures and are asked to name the criminal. This aspect of radiography concerns diagnosis. To do it well we must know what characteristics to look for. There is sure to be overlap of the features of the different diseases because of the limited responses of the tissues visualized. The other contribution of radiology is the evaluation of the stage of a known disease and the correlation of the radiographic appearances with disturbances of function, or the likely success of some form of treatment or the rehabilitation programme. Here we have as it were a "still" taken from a moving picture. From what stage of the story does it come? One is constantly surprised at the range of movement present in a joint, the radiological appearance of which seems to be inconsistent with any movement at all.

In rheumatoid arthritis the hands and feet give the best diagnostic X-ray films. Early in the disease soft-tissue swelling only may be visible, but this is often associated

with decalcification of the ends of the metacarpals, of the proximal phalanges and of the bones of the carpus. This corresponds to the stage of early synovitis and commencing pannus formation. A little later erosions will be seen of the juxtachondral bone, together with slight loss of joint space; small cysts may develop in the carpal, metacarpal and proximal phalanges. This is followed by mild subluxation at the metacarpo-phalangeal joints and possibly the proximal interphalangeal joints, with increasing destruction of the heads of the metacarpals. At this stage secondary proliferative changes of the osteoarthritic type may be superimposed on any of the damaged joints. These are distinct from the ordinary osteoarthritic changes which may have occurred at the usual sites of such changes in the hands—the proximal and distal interphalangeal joints and the first carpo-metacarpal joint—which may have been present before the rheumatoid disease commenced. Some porosis of the shafts of the bones may occur in addition to the selective porosis at the ends. The feet may show similar changes, sometimes occurring rather earlier than in the hands. It is not uncommon for serial radiographs to show progressive changes even in apparently quiescent phases. Such progressive changes have recently been reported in the Empire Rheumatism Council's series of cases; these patients were apparently in remission after gold therapy. Local and systemic steroid therapy has been blamed for accelerated destruction of joint tissue, possibly because of the extra use of the joint while the subjective inflammatory phenomena have been suppressed. Examination of biopsy material shows that inflammatory activity is readily recognizable in both types of treatment, and more definite in the local than the systemic administration.

Fibrous ankylosis, which, except in the juvenile form of rheumatoid arthritis, is much more common than bony ankylosis, will not be seen, but may be inferred when the wrist, for example, is immobile in a poor position.

In the differentiation from gout it is well to realize that there are no bony changes until tophaceous deposits of sodium biurate crystals have eroded the bone. These then show as radiolucent areas or cysts. There should be no associated osteoporosis in gouty lesions. At a late stage when chronic gouty arthritis has developed, secondary proliferative changes will be seen.

In disseminated lupus erythematosus the joint changes are usually of a minor nature, but sometimes there are gross changes identical with those seen in rheumatoid arthritis. In scleroderma the changes are not those of arthritis, but rather a progressive absorption of the terminal phalanges. Calcinosis may be seen.

Sarcoid rarely causes arthritis. In this disease there are bone cysts, often in the metaphysis or in the terminal phalanx; the joint space is undiminished. Some changes in the trabeculation of the bone may occur.

Hypertrophic pulmonary osteoarthropathy is associated with bronchogenic carcinoma and may cause a condition clinically similar to rheumatoid arthritis, although lacking the symmetry. Clubbed fingers are usually present. The bones of the hand and the distal ends of radius and ulna may show periosteal thickening. X-ray examination of the chest should be done to confirm the suspicion of malignant lung disease.

In ankylosing spondylitis radiological examination of the sacro-iliac joints is required to confirm what is often only a clinical suspicion. Many cases are diagnosed at a stage when one sacro-iliac joint only is affected. Some of these run a comparatively benign course. Some may present as acute arthritis of a single peripheral joint, such as an ankle or a knee in a young man. Some start with a painful heel. Associated lesions include erosion of the pubis at the symphysis, periosteal thickening of the ramus of the pubis or of the iliac crest and a calcaneal spur. The development of lesions of the apophyseal joints and calcification of the long ligaments of the spine are often delayed and should not be relied on for early diagnosis.

In the assessment of the stage and treatment potential of the rheumatoid arthritic patient X-ray examination of the knees, shoulders and hips is often necessary. The radiographic appearances may well determine the choice of treatment, orthopædic procedures or rehabilitation programme.

The arthritic conditions discussed are chronic and potentially progressive. As this paper is presented in conjunction with one from the Section of Radiology, I have concentrated mainly on those aspects of the subject which represent common ground for clinician and radiologist, such as the types of rheumatic disease, the pathology, the diagnosis and the evaluation of stage and progress in relation to the radiographic appearances of the joints.

Summary.

The development of arthritis in relation to infection is discussed, with reference to types in which infection of the joints may occur and to other types in which infection may play an aggravating or precipitating role. Rheumatoid arthritis and other "non-infective" forms of joint disease are discussed with reference to the polysystemic nature of the malady. The limited range of pathological changes of which connective tissue is capable is responsible for the difficulty in the correlation of the histopathology with the classification of the disease entities and ætiology. Preoccupation with collagen has drawn attention away from the cellular components of connective tissue and the possibility of the collagen material being damaged by the cellular response secondary to an antigen-antibody reaction.

The role of radiography in diagnosis and in the assessment of progress in chronic arthritis is discussed, with comments on the correlation of clinical features and radiographic appearances. Such correlation is especially important when programmes of orthopædic treatment or rehabilitation procedures are being considered.

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A SURVEY OF ONE HUNDRED AND THIRTY-FOUR NEONATAL AUTOPSIES.

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AT the Queen Victoria Hospital, Adelaide, 134 neonatal autopsies have been carried out and it is proposed to review these cases in the belief that they represent a cross-section of neonatal deaths in Australia. Of the total number of infants, 54 were still-born, nine lived less than one hour, 32 lived under one day and 39 lived one day or more.

Still-born Infants.

Fifty-four infants were still-born. If 6 lb. (2721 grammes) and 8 lb. (3628 grammes) are taken as the lower and upper limits of normal respectively, then 20 infants were underweight, nine were overweight and 17 were of normal weight. In eight cases the weight was not known.

If infants under 5 lb. (2268 grammes) are considered immature, then 16 of the 20 underweight infants were immature. Nine infants lived one hour or less; three of these were premature. One, weighing 2 lb. 2½ oz., lived

one hour; one, weighing 2 lb. 8 oz., lived 15 minutes; and one weighing 3 lb., lived one minute. Five weighed 8 lb. or more; one weighing exactly 8 lb., lived five minutes and one weighing 8 lb. 10 oz., died at birth. In one case the weight was not recorded. So little can be done to save the infant in one minute, or even 15 minutes or 30 minutes, that these can be considered with the still-born.

There were thus 55 weighed "still-born" infants. Of these, 23 were underweight (19 of the 23 being immature) and 11 were overweight. These figures suggest that prematurity and overweight in themselves play an important part in non-survival.

Underweight Infants.

Of the 23 underweight infants, one was macerated (it weighed 5 lb. 12 oz., perhaps as a result of placental insufficiency), and autolysis, showing that death had occurred some while before labour had commenced, was present in four more (one weighed 5 lb. 8 oz., and had some petechiæ, suggesting an asphyxial death; one weighed 4 lb. 6 oz., and had its cord tight around its neck; one weighed 4 lb. 1 oz., and had a hypertensive mother; and one, weighing 3 lb. 7 oz., had some petechiæ, and accidental hæmorrhage had occurred during the pregnancy.

Congenital deformities seem responsible for the still-births of a female infant weighing 3 lb. 12 oz., who had a ruptured encephalocele with exomphalos, and for an infant weighing 3 lb. 10 oz., who had transposition of the pulmonary artery and aorta, an imperforate anus with ballooned rectum and deformities of the fingers.

Hydramnios was responsible for the still births of an infant weighing 1 lb. 3 oz., and another weighing 4 lb. 13 oz. In the latter case excess of fluid was found in the right pleural cavity.

The cord was found tight around the neck and autolysis was commencing in a female infant weighing 4 lb. 15 oz.

Accidental hæmorrhage was the cause of death in three infants, weighing respectively 2 lb. 8 oz. (petechiæ were present in this case), 2 lb. 13 oz. and 3 lb. 7 oz. (in this case the skin was slipping and petechiæ were present). A case of partial separation of the placenta, with the cord "knotted" round a leg, probably belongs in this category.

Placenta prævia was present in the case of an infant weighing 2 lb. 14 oz.

Placental insufficiency was thought to be the cause of death of a macerated male infant of 5 lb. 12 oz.

Premature rupture of the membranes, with prolapse of the cord in the case of an infant weighing 4 lb. 10 oz., who showed petechiæ, suggested an asphyxial death, probably from pinching of the cord.

Maternal high blood pressure was present in the case of two infants, one weighing 4 lb. 1 oz., whose skin was slipping from autolysis, the other weighing 5 lb. 4 oz. with petechiæ in the lungs and on the heart, which suggested an asphyxial death. Another hypertensive mother, who was also œdematous, had a still-born infant weighing 4 lb. 5 oz., whose bladder was distended to the umbilicus.

Acute hydramnios was present in the mother of a female infant weighing 4 lb. 13 oz., who had an excess of fluid in her right pleural cavity.

Petechiæ suggesting asphyxia were present in an infant weighing 4 lb. 8 oz., and in a male weighing 5 lb. 8 oz., in whom autolysis was commencing.

Infants of Normal Weight.

In five of the 17 infants of normal weight, death must have preceded labour, as the skin was slipping from autolysis. In two of these, petechiæ, suggesting an asphyxial death, were detected, and one of the two had a large, pale, œdematous placenta. In another of the four, the Rh factor was probably responsible. One had coarctation of the aorta. Two of the 17 were victims of Rh incompatibility, one having hydrops, the other showing petechiæ. One had a prolapsed cord with anoxia, in one there was a scrotal presentation with a prolonged second stage. In a breech case, large fontanelles suggested possible pressure on the brain; one woman was in labour for three days, and the infant showed petechiæ. In the case of a hypertensive mother, the infant had petechiæ and the placenta was considered insufficient; one infant presented in the occipito-posterior position, and had petechiæ. Accidental hæmorrhage seemed responsible for the death of one; one infant had no placental insufficiency, but had fluid in both pleural cavities, compressing the lungs. Of the remaining two, one died during labour, and the other had petechiæ.

The only comment that seems possible is that reduction in the length of labour might have saved a few of these infants.

Overweight Infants.

Autolysis was present in three cases. In two babies, each weighing 8 lb. 8 oz., the skin was slipping, showing that for some reason the infants had been dead for several days. It is noted in one that there was no insufficiency of the placenta. The third infant with autolysis had an anæmic mother, and some accidental hæmorrhage had occurred.

Prolonged labour was present in four cases. In the heaviest of the overweight babies, a boy weighing 11 lb. 12½ oz., the shoulders were impacted and petechiæ indicated an asphyxial death. An infant weighing 8 lb. 3¾ oz., who had presented in the occipito-posterior position and whose labour had been long, had petechiæ also, and a distended bladder. An infant weighing 9 lb. 2 oz. was delivered by Cæsarean section after a prolonged labour, associated with a contracted pelvis, separation of the placenta and a ruptured uterus. The fourth child, a male, weighed 8 lb. 3 oz.

The heart of a male infant weighing 9 lb. stopped during labour; the liquor was meconium-stained and petechiæ were present. An infant, merely described as large, had shown no movements for 15 hours, and had petechiæ.

Of nine overweight babies then, three had been dead some days, anæmia in the mother of one perhaps being responsible. Prolonged labour, mostly with severe complications, was responsible for four deaths. The two other deaths occurred during or just before labour. It seems difficult to suggest any means that could be taken to reduce this mortality in overweight infants.

Infants of Unknown Weight.

Of the eight still-born infants whose weights were not available, one had prolapse of the cord and petechiæ; one had intraperitoneal hæmorrhage and hæmorrhages in the lungs and pericardium. A mother of 17 had pre-eclamptic toxæmia, the cord was round the baby's neck, and the lungs were pale. One had the cord three times around the neck with a true knot, and petechiæ; one was born by the breech and had large, polycystic kidneys. In one case the mother, who was Rh-negative, had pre-eclamptic toxæmia, and in two infants maceration was present.

Here again, it seems difficult to suggest what preventive measures could have been taken.

Infants Living One Hour or Less.

Nine infants lived one hour or less. Four were premature, and two overweight. One of the latter (weighing 8 lb.), who lived five minutes, had prolapse of the cord and a thymus weighing 19 grammes. A baby, weighing 3 lb. who lived one minute, had a large omphalocele and a meningocele. Two infants, weighing 2 lb. 2½ oz. (914 grammes) and 2 lb. 8 oz. (1134 grammes), lived 30 and 15 minutes respectively. A baby weighing 7 lb. 8 oz. (3402 grammes), whose mother and grandmother were diabetics, lived only five minutes. A heavy infant of 8 lb. 10 oz. (3912 grammes), after a long first stage with fœtal distress, died at birth. A six-weeks premature infant,

whose mother had acute hydramnios, gasped twice and died. The twin of a breech case, whose mother had increasing hypertension, lived five minutes and had a thymus weighing 18 grammes, and the ninth baby, a girl who lived five minutes, had had a fœtal heart rate which was slowing and irregular during the latter part of labour.

Infants Living between One Hour and One Day.

Thirty-two infants lived between one hour and one day. Half of them (18) were immature (weighing less than 5 lb. or 2268 grammes). Thirteen weighed less than 4 lb., 10 less than 3 lb., and three less than 2 lb. (the actual weights were 1 lb. 5¾ oz., 1 lb. 9 oz., and 1 lb. 12 oz.). Seven other infants weighed between 5 lb. and 6 lb. Only two babies weighed more than 8 lb. The remaining five weighed between 6 lb. and 8 lb.

I think it is unreasonable to consider that purple, airless lungs in infants who have lived less than a day may be lungs which have been expanded, but whose air has been imprisoned and then absorbed. The three infants who weighed less than 2 lb. lived for 4, 13 and 24 hours respectively; air was present in the lungs of the last mentioned, who weighed 1 lb. 12 oz., and death was attributed to the immaturity, but the lungs were dark purple and airless in the other two.

Of the seven infants who weighed between 2 lb. and 3 lb., one had a meningocele, horseshoe kidneys and one airless lung, and one had an intracranial hæmorrhage. In one case hysterotomy was performed for severe malignant hypertension and preeclamptic toxæmia, and the infant had fluid in the right pleural cavity and peritoneum and atelectatic lungs (it had lived 12 hours and had partly expanded lungs and air in the intestines). A baby with a brow presentation and long delay also lived 12 hours and had partly expanded lungs; the infant of a mother with high blood pressure and albuminuria lived five and a half hours and had unexpanded lungs; and the seventh infant, who lived for one day, had dark purple lungs and air in the stomach and intestines. Three infants weighed between 3 lb. and 4 lb.; in the case of one who lived for a day, the mother had some accidental hæmorrhage, signs of fœtal distress were present and the lungs were imperfectly expanded; an infant delivered by Cæsarean section for placenta prævia had purple, airless lungs and air in the stomach and intestines; and a twin who lived 10 hours had mostly unexpanded lungs and air in the stomach and duodenum for 40 inches down the small intestine. There were five infants weighing between 4 lb. and 5 lb. One had a meningocele and cystic kidneys, the ureters being mere threads; another had considerable emphysema with bullæ of air in the thymus; the other three, who lived 14 hours, 18 hours and one day respectively, had apparently completely atelectatic lungs, with air in the stomach and intestines; in one case the air in the intestines seemed sufficient to embarrass the lungs.

It should be noted in how many of these premature infants surviving for from one hour to one day the air seemed to by-pass the lungs and fill the stomach and intestines.

Seven other infants were underweight, weighing between 5 lb. and 6 lb.; one had a meningocele, and two had polycystic kidneys. A child who presented as a breech had a toxæmic mother and umbilical hæmorrhage; he was transfused and a subdural blood clot, hæmorrhagic renal medullæ and hæmorrhagic testes, presumably asphyxial in origin, were found. The remaining three had airless lungs; one mother had melanomas and died soon after childbirth, while another mother had severe cardiac failure and air was found in the stomach and intestines of the infant.

Seven infants out of the 32 weighed more than 6 lb. (2721 grammes). Two of these were delivered by Cæsarean section; one came from a ruptured uterus, the infant having partly expanded lungs and petechiæ; and the infant in the other case had some hyaline membrane, and air in the stomach and intestines. One infant, who lived 10 hours (whose mother had a placenta prævia), had air only in the anterior tongue of the right middle lobe, air in the stomach and intestines, and a large thymus. Another infant, who lived six hours (whose mother was Rh-negative and gave a positive result to the Coombs test), collapsed after transfusion and had imperfectly expanded lungs. The lungs were quite airless in the baby of a diabetic mother weighing 8 lb. 1½ oz., who lived 11 hours; they were dark purple and mostly airless in the infant of a mother with preeclamptic toxæmia, who had meconium-stained liquor; and they were mottled, with many parts sinking, in a heavy baby weighing 8 lb. 7 oz.

These 32 infants, more than half of them immature, had mostly purplish, unexpanded lungs, or lungs which were only partly aerated. In some otherwise solid-feeling lungs, air may be present in the anterior tongue of the right middle lobe, or in this and the anterior portion of the upper lobes, especially the right. Why should it find its way there and yet fail to inflate other parts?

Infants Living Longer than One Day.

Infants that lived for more than one day occasioned particular interest. In general one would expect that the longer a baby lived, the more likely it would be to live longer. It is surprising on the other hand that some live as long as they do. Thirty-nine infants in all lived longer than one day.

Premature Infants.

Sixteen out of 34 whose weights were available weighed less than 5 lb. (2268 grammes), and so may be considered premature. Thirteen babies lived seven days or longer, but only two of these were premature, one was a twin, weighing 2 lb. 10 oz. (1189 grammes), who lived 12 days and whose entire right lung and lower lobe of the left lung were airless, and the other was a baby weighing 4 lb. 15¼ oz., who lived a week and died with a coliform meningitis, and whose bronchioles and alveoli were filled with red cells. The remaining 14 premature infants lived less than a week. Two weighed less than 2 lb. (907 grammes), three weighed between 2 lb. and 3 lb., five weighed between 3 lb. and 4 lb. and six weighed between 4 lb. and 5 lb. One, which lived one and two-thirds days, had a hopeless prognosis, having an umbilical hernia with adherent coils of intestine, a double harelip and a defect in the interventricular septum of the heart. A female twin, weighing 2 lb. 7 oz. (1104 grammes), who lived six days, had a large pulmonary artery running into the aorta (the aorta supplying the head and upper limbs), a defect in the interventricular septum and erythroblastosis, so it is surprising that it lived so long. An erythroblastotic infant with kernicterus lived three days. One of the smallest babies, weighing 1 lb. 11 oz. (764 grammes), who lived 28 hours, had pale, airless lungs except for the anterior parts, a distended bladder and a double harelip and cleft palate.

The remaining 10 premature infants, who lived between 28 hours and six days, all had plum-coloured to purple, airless lungs, except, in some instances, for the anterior portions. To what extent, in these lungs which have never been completely expanded, and in how many, has air been imprisoned by some obstruction and then absorbed? The portions of lung in which air may be present in these cases are the anterior tongues, especially of the right upper and middle lobes, particularly the last named. Does this mean that these are the parts of the lungs most easily inflated, or that the lungs have been expanded and the blood supply to these parts is too poor to allow the air to be absorbed? In two of the premature infants, blood filled the bronchioles and alveoli, and had presumably been inhaled. No anxiety was felt about one infant at birth, but it had a cyanotic attack 10 hours later and died after six days, with dark purple, airless lungs, and no hyaline membrane. Air in the upper part of the small intestine was seen in one case and recorded in the stomach in another, but it probably was not sufficient to be an embarrassment to the lungs. Petechiæ

in the lungs, thymus or heart were not noted in these cases. When the premature infants were drowned in blood, I believe nothing could be done. Cases of hyaline membrane seem not to have been recorded. However, in nine cases of the 16 the baby might have lived had it been possible to ventilate the lungs. What prevents this? The epiglottis of a neonate is folded, sometimes very much so, and is rarely nearly flat, as in the adult. It must be very easy for it to obstruct the entrance of air. Once air enters the stomach and intestines, it probably tends to by-pass the larynx, and in some cases the intestines are so distended with air that they obviously can be an embarrassment to the lungs. This distension can be readily detected by a tympanitic note. Feebleness of effort from immaturity is probably the chief factor involved.

Infants Living One Day and Less than One Week.

Twenty-six infants lived one day, but less than seven. Of these, 14 were immature and have already been considered. Of the 12 remaining, one was an Rh baby, jaundiced and with petechiæ, while two, each of whom lived two days, had congenital heart defects, with the pulmonary artery supplying the abdominal aorta and much lung unexpanded. One was a case of fibroelastosis of the right ventricle with pulmonary stenosis and one, who lived five days, had pneumonia; one had a double harelip, extra digits, a frontal bone like the prow of a ship, and coarctation of the aorta. One had a hæmorrhagic diathesis with bleeding into the stomach, petechiæ in the skin and lungs and also a pneumothorax; the œdematous infant of a diabetic mother, who lived one and a half days, had a considerable amount of hyaline membrane in mostly unexpanded lungs. An infant who lived five days had pneumothorax with some collapse and polycystic kidneys. Of the remaining three infants, two had had forceps applied, one for a prolonged second stage, the baby living one and a half days with petechiæ in the lungs and brain, and the other had had an impacted shoulder; a long time had elapsed before the infant breathed, and then it only gasped, and died in three days with lungs imperfectly expanded. The remaining infant was a large one (weighing 8 lb. 1 oz.), who lived two days and had dark red, firm lungs. Perhaps in the last two babies only was there a possible chance of worth-while survival.

Infants Living More Than One Week.

Thirteen infants survived longer than one week. Death might reasonably have been expected in several cases. One was a case of heart failure, in which the mitral valve was reduced in size and had miliary elevations (the child lived 58 days); two infants had coarctation of the aorta with large portions of the lungs airless; there were two cases of meningitis; one infant with an encephalocele lived 20 days; one had staphylococcal abscesses in the lungs, heart and liver; and a male child, who lived nine days after a normal delivery, developed pyrexia and difficulty in breathing—he died after a sudden deterioration in his condition, and was found to have a hæmorrhagic disintegration of the frontal lobes. One baby developed pneumonia two days before its death at 11 days; another, who died at the age of 15 days, had an umbilical infection, mottled lungs, a patent ductus arteriosus and a harsh systolic murmur.

Of the remaining three infants, one, who lived eight days, was born by Cæsarean section of a diabetic and toxæmic woman, and had dark red, solid lungs, with blood in the bronchioles but no hyaline membrane; one, who lived 10 days after a prolonged instrumental labour, had been slow to breathe, and at death had some air in the anterior parts of the otherwise solid lungs; and the remaining one was a twin, who lived 12 days and died with the right lung and lower lobe of the left lung airless. Of the 13, then, who lived for a week or more, the last three only perhaps could have been saved if expansion of the lungs had been effected.

Distended Urinary Bladders.

At autopsy, the urinary bladders of still-born infants are usually contracted and thick-walled—seemingly unduly thick-walled. Occasionally the bladder is distended, sometimes to the umbilicus. Recently I have made a special note of this when present. Out of nine recent cases I found a tight prepuce in one and the ureters as well as the bladder were distended. Distended ureters were not recorded in the other seven. The weights of the infants varied from 2 lb. 12 oz. (1247 grammes) to 9 lb. (4082 grammes), so size apparently plays no part. One mother had acute hydramnios. All the infants were still-born, except one who lived for 10 hours, and whose mother had severe cardiac failure. In another, autolysis was commencing, so that the condition is not necessarily associated with labour. The mother had a high blood pressure and was œdematous in one case. One infant with a double harelip and a cleft palate, had a bladder distended to the umbilicus. The bladder seems to be either distended or empty, but not partly filled. I fail to see any significance in the findings of a full bladder.

Air in the Stomach and Intestines.

Twelve infants had air in the stomach and upper part of the small intestines, and three more in the stomach. In one, the air descended for 40 inches. In five cases of the 12, the infant lived 12 hours or less; in four more it lived half to one day. One infant was nine days old, its condition having suddenly deteriorated, and at autopsy hæmorrhagic disintegration of the frontal lobes was found. Blood was present in the bronchioles and alveoli in one infant, thus preventing the entrance of air. Seven of the other 11 had purplish, airless lungs, and four had some recognizable air; in one case this was noticeable only in the anterior tongue of the right middle lobe. In some of these babies, the amount of air in the small intestines seemed likely to be a definite embarrassment to air entering the lungs.

Interesting Conditions Present.

There was one case of a shrunken brain with megalocytic inclusions. One infant had fibroelastosis of the right ventricle, and one fœtal endocarditis of the mitral valve. Six infants at least were erythroblastotic, while four had interstitial emphysema, with bullæ in the lungs or pneumothorax. Five had meningoceles or encephaloceles, one of them with an omphalocele as well. Two more had umbilical hernias, and one of these also a double harelip. One child had a prominent frontal bone like the prow of a ship, a double harelip and a cleft palate, extra digits and coarctation of the aorta. Six had coarctation of the aorta with an open ductus, and another transposition of the aorta and pulmonary artery, with an imperforate anus, a diminutive penis and abnormalities of the digits. There were only three examples of birth injuries to the brain. Polycystic kidneys were present in three cases. There was fluid in the pleural cavities in one case and staphylococcal abscesses were found in one. The testes were nearly black from intense congestion and some hæmorrhage in the child with a scrotal presentation, and in some infants with intense cyanosis. The spinal cord was pulled out intact in one. In one infant with autolysis, the bones of the skull had separated from their attachments. How long does it take for the enzymes responsible to digest the membranous portions (perhaps this is important from a medico-legal point of view), and from what cells does this enzyme come?

Summary.

A detailed survey of the autopsies performed on 134 neonates has been made. The neonates have been considered from the point of view of duration of post-natal life, and have been divided into still-born infants, those living one hour or less, those living from one hour to one day, those living from one day to one week, and those living more than one week. They have also been considered from the point of view of weight—that is, whether

immature, of average weight or overweight. Among those infants who lived, airless lungs (completely or nearly so) were by far the most common findings, and must be held responsible for most of the deaths. Though it may perhaps be easier to obtain permission to examine a baby with congenital abnormalities than a normal infant, the number of these abnormalities in the nervous system and in the heart in this series probably represents approximately the number to be expected in neonatal deaths in general.

NOTES ON A THERAPEUTIC COMMUNITY: II.[1]

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The Therapeutic Community as a Resocializing Agency.

A NUMBER of other institutions attempt drastically to resocialize individuals apart from psychiatric clinics. For example, parochial schools, private colleges, army academies and the training convents or monasteries of religious orders attempt to socialize the individual in their special interests. These agencies apply the principle of isolation and initiation into the new community in a remarkably homogeneous way. Even professional schools teaching a special ethic and a sense of professional identity use these methods. For example, medical schools are usually physically separated from the rest of the university and attempt to create an *espirit de corps* (Broom and Selznick, 1958). Thus these agencies accept the premise that the more exclusive is their access to the individual, the more effective their influence is likely to be. The United States Coast Guard Academy provides a typical instance of this. The new cadet is allowed no contact with outsiders for a period of two months. He is not allowed to leave the base or to go to any social activities with non-cadets, nor is discussion of his previous family wealth or background allowed. He is not allowed to receive money from home and his cadet role must supersede all others. As a "new chum" or "swab", he has a very low status and this, with initiation rituals, encourages him to place a high value on the successful completion of the Academy career course and a realignment of his identity on the basis of this very tight community (Broom and Selznick, 1958).

In the therapeutic community of Fraser House (Yeomans, 1961) a similar programme is instituted and it is believed that for the first month no patients should have any visitors who are not actually being treated with them. An exception is made in the case of a married person in that if the spouse is coming to the once-a-week married couples' group, he or she is allowed to visit in ordinary visiting hours as well as from the very first week. Children younger than teenagers of such a couple are allowed complete freedom of visiting, so that here we have a family unit as it were in treatment, and no restrictions are made. In the case of single people it is not possible to offer treatment to brothers and sisters or parents in many cases, so that these are completely restricted in visiting for the first month. Again, to introduce the patient as a new member of the community and to force him to abandon his previous social bonds, it is thought desirable in most cases to describe to the group the symptoms and problems as they have been told to me in the initial screening interview. As an initiation ceremony rather like *rites de passage* (Honigmann, 1959), this concrete dramatic event helps the patient to pass from the outside environment to a new status and role in the unit. This obviously can be extremely disturbing and traumatic to the patient, and this point will be referred to later. However, in all cases under my personal care, patients are told at the initial interview that no subjects are confidential only to the patient and the doctor, or to the patient and the nurse, but must be brought up in the group discussions. Again and again one has seen patients who have quite effectively brought their outside environment into the hospital and have resisted all attempts at treatment until something of a drastic nature such as this was done.

A married woman, who was an in-patient here for some months last year, brought with her a typewriter and a great deal of work from the company at which she was employed. She was being treated by another doctor at the time and she was usually to be found in the ward alone, or even with a few people in one of the small rooms, typing away, so that in effect she was completely isolated from the influence of the unit.

Another middle-aged married woman used many devious methods by which she obtained leave in the afternoons and returned to her home near by where she effectively ran the house in its previous pathological manner for some months. In this home she had successfully alienated her husband from her teen-age children, so that even while in hospital she remained the completely dominant personality in the family. In the case of this particular patient I have often felt that perhaps a strenuous attempt could have been made to bring the husband into group therapy with his wife.

It must be made clear at this point that this policy of isolating the patient is an expedient to hasten the therapy of the individual person and does not apply in cases in which it is both economical and practical to treat the entire family. While theoretically when a patient presents himself or herself for treatment it may be desirable to treat all living members of the family and perhaps even the subcommunity of friends, this would seem impracticable at present. Again, this isolation of the patient may in some cases lead to a very acute relapse in the mental state, and a unit such as this must be completely prepared to support an intensified therapy in such a patient so that when he reconstructs his personality it is radically improved and far more normal in its structure.

For example, one patient who, in her own words, had been "hanging on" for years, finally found herself unable to work, weeping and unable to carry on any longer. When she was forced to break her outside bonds and brought hard up against the emotional contact of the unit, her condition very rapidly deteriorated; she became acutely psychotic, hysterical and depressed. Problems of her complete independence and her extreme isolation through most of her remembered life were thus brought acutely to the surface. However, being exposed to the therapeutic atmosphere of the other patients forced her to turn to them for help, and within 10 days of her acute schizophrenic relapse the patient had changed over to a vacillating overdependency, which very rapidly brought her into close contact with many other patients and members of the staff of the unit. Thus she was able to be integrated very quickly into the therapeutic atmosphere and the reconstruction of her defences proceeded so that they were fundamentally different and more normal than they had ever been in the past.

Age Grading and Kinship Lines.

In the simpler societies age grading, although important, is somewhat secondary to what one may call the vertical alignment of kinship groups so that the extended family provides social bonds which are much stronger than those between people in the same age groups. However, in the more complex, although pre-literate societies, age grading tends to become more important and, as pointed out by Sprott (1958), in some African societies where kinship links are less strong, secret societies, clubs based on age groups and so on become predominant. In complex literate societies—that is to say, modern ones—age grading is one of the basic lines along which the divisions of society go, and thus their emphasis in a therapeutic community is extremely important if the personality changes produced are to align the patient with the normal outside life in which he has to live.

At the same time, kinship links are also important, though reduced, and these are encouraged, particularly in the community group by the relationships that develop between older and younger people at these meetings.

In Fraser House the age range of the population is from approximately 16 years to usually under 60 years. Owing to a hiatus in facilities for the treatment of

[1] Read at a meeting of the New South Wales Branch of the Australasian Association of Psychiatrists held at the North Ryde Psychiatric Centre on May 14, 1961.

adolescents, it was decided that four male beds and four female beds would be left vacant for this group of people, so that one of the small therapy groups consists of eight teen-agers. In the original formation of this group, whose therapy I conducted myself, the formation of a teen-age gang (youth culture) was encouraged. After this had begun to consolidate its existence, other doctors and nurses took the group for various meetings. It was against this background that an example of conflict arose in one particular community therapy meeting.

As a teen-ager was being introduced to his first large group, it was suggested by a middle-aged alcoholic that new patients should be introduced on the first day and that details of their diagnosis, their problems and the way in which the group could help should be introduced immediately. I agreed to the value of this (as previously discussed), went to collect the boy's card and gave the group as much information as I could. This led to the launching of an aggressive attack by a middle-aged drug addict, and by an alcoholic, whereby questions were asked of the patient in a way which was quite malicious and intended to condemn. They referred particularly to the problem of whether he was a homosexual or not. No teen-agers took part in this aspect of the discussion, until another alcoholic commented that the meeting was not a trial. In this he was supported by a homosexual (who also pointed out that it was not an inquisition), a teen-ager and myself. I specifically questioned the second alcoholic when he started on this aspect of the discussion to encourage the formation of a group in support of the new patient, as opposed to the quite obvious anti-new-patient group that had already formed. One middle-aged woman who attempted to support this boy became so involved that she burst into hysterical weeping which could not be controlled for some time.

In the formation of these groups around the problems of a teen-ager, it was significant not only of the dynamics of the people concerned, but of their age relationships, that those in the group against him were the older people, whereas in the group for him there was a mixture of both older and teen-age people; the teenagers, particularly the lad who had first supported him, pointed out that an aggressive, authoritarian questioning by older people had only produced a tissue of lies in his answers under similar circumstances. Here we see an example of both the personal dynamics and the age grade of the people concerned affecting the formation of the two sections of the discussion, supporting the patient on the one hand and attacking him on the other. This incident is one of many which illustrate how basic social categories cut across and can be used to support and aid in the intensive group therapy of the patient. This particular example refers to a particularly common sub-grouping amongst the community whereby teen-agers provoke the emotional response of middle-aged adults, particularly those with teen-age children of their own; and in fact, the woman who broke down and wept has teen-age children whose relationship with her is a source of constant anxiety. Indeed, it has been quipped that the problems of teen-agers arise from the adjustment of their parents to middle age.

By contrast, a week or so later one may see the operation of unconscious kinship lines running through the community meeting and binding the group together in the vertical alignment.

On this occasion the topic discussed was the allotting of one night a week on which the younger people in the unit, particularly the teen-agers, would be allowed to use the meeting hall for dancing with records and other activities from which the older people could be excluded. This was a step towards the specialization of social activities by patients. Again the woman who wept was involved, this time arguing against the topic and reiterating again and again that a 50-50 dance would be more suitable, although in fact there is a patient dance two nights a week already allowed for. The first-mentioned alcoholic, whose antagonism for teen-agers had been very greatly ameliorated, argued strongly in support of the motion, demonstrating a clear picture of kindred transference (Honigmann, 1959). The woman later reversed her opinion when the illogicality of her argument was attacked very strongly by a number of the more neutral group of younger adults. A number of the teen-agers were clamouring for almost nightly freedom, while a number of the more elderly people were quite punitive in their approach. However, gradually a compromise was worked out whereby the teen-agers, 10% of the unit's population, were allotted the desired evening's entertainment.

It was possible to perceive how individual transferences between the different age groups tended gradually to force the community to a satisfactory compromise, younger sub-groups controlling their more selfish members' statements, while older sub-groups attacked their most unfair members.

Thus members of the various age grades of the community are able to see themselves, and the problems which surround them, in each other, and through living together in the unit to work out a satisfactory adjustment to their life situations.

Conclusions.

Sociological principles applied to a therapeutic community can be seen to aid in the elucidation of patients' interactions and to provide the background for the rational use of social forces in psychotherapeutic technique.

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Reports of Cases.

AUTOSOMAL CHROMOSOME ANOMALIES.

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ANOMALIES of the sex chromosomes are now well recognized and documented in the Turner and Klinefelter syndromes and in the "super" or "meta" female state, which is less well defined clinically. Abnormalities of the autosomes are, with the exception of mongolism, less well documented.

The finding of trisomy of chromosome 21 of the Denver nomenclature (Puck, 1960) in classical mongolism has been fully substantiated since the original description by Lejeune *et alii* (1959). The translocation of this additional chromosome on to another chromosome in some cases of familial mongolism has been demonstrated by Polani *et alii* (1960), and subsequently confirmed by Penrose *et alii* (1960).

Other autosomal anomalies have been described, but the clinical manifestations of these have been varied. Turpin *et alii* (1959) described the case of a boy, aged four years, with mild mental defect and abnormalities of the vertebral column, who had 45 chromosomes with a translocation between one of the 13 to 15 group and one of the 21 to 22 group. Edwards *et alii* (1960) reported the case of a female infant with a receding chin, malformed ears, neck webbing and congenital heart disease, who showed trisomy for chromosome 17 (Denver). Trisomy for one of the 13 to 15 group was found by Patau *et alii* (1960) in a female infant who had a cerebral defect and other minor abnormalities. A remarkable case of triploidy—that is, trisomy of the autosomes and XXY

sex chromosomes—was described by Böök and Santesson (1960) in a male infant with a hypoplastic jaw, syndactyly of the hands and feet and probable porencephaly. Hayward *et alii* (1960) described the case of a boy, aged four years, with severe mental retardation and the Sturge-Weber syndrome, in whom there was trisomy of chromosome 22. Subsequent observations by Lehmann and Forssmann (1960) and an unpublished observation of our own have shown that trisomy of chromosome 22 is not a general feature of the Sturge-Weber syndrome. Tjio *et alii* (1960) described enlarged satellites in two familial cases of Marfan's syndrome.

In the course of a series of investigations into the incidence of chromosomal anomalies in mentally defective children, the following case came to our attention. This child was selected for study on account of the combination of multiple congenital deformities with mental defect.

Clinical Record.

The patient, a girl, was born on January 1, 1947. The parents were in normal health at the time of conception, the mother being 23 years of age and the father 33 years of age. The pregnancy is said to have been uneventful, with no maternal illness or X radiation. The birth was one month premature. Labour lasted seven hours, the child weighing 4 lb. 4 oz. at birth. The infant was admitted to the Royal Alexandra Hospital for Children at two weeks of age with cleft palate, bilateral talipes equinovarus, divarication of the recti and possible torticollis.

At the time of admission to hospital the infant weighed 4 lb. 8 oz. Slow progress was made in hospital, with a weight gain of only 10 lb. at 16 months of age. At this time the severity of the talipes had decreased and examination revealed a widely patent fontanelle, marked epicanthic folds, torticollis, divarication of the recti, a cleft palate, flexion deformity of the knees, very narrow shoulders and general hypotonia. Radiographic examination showed poor osseous development and calification. The hæmoglobin value was 9·8 grammes per 100 ml., the blood urea level was 42 mg. per 100 ml., and examination of the urine showed no abnormality.

At the age of one year and nine months the patient was discharged from hospital. During the next 12 months she made slow progress, being unable to sit up and showing little emotional response. At the age of two years and 10 months she was admitted to the Mental Hospital, Watt Street. At this time she weighed 13·5 lb., and was 2 feet 3 in. tall. Some webbing of the neck was apparent at this time. The fontanelles were closed and a general flaccidity was noted. The child was unable to sit up. The patient was transferred at the age of six years to the Mental Hospital, Stockton, by which time she was able to walk with a spastic gait, to understand simple sentences and to speak simple words.

On examination in February, 1961, when aged 14 years, she weighed 6 stone and was 3 feet 8·5 in. tall. The face showed asymmetrical development, with webbing of the neck and deformity of the right ear; there were marked epicanthic folds (Figure I). Both soft and hard palates were cleft and the alveolus was intact. The chest was shield-shaped, with narrow shoulders and webbing of the anterior axillary folds. The heart, lungs and abdomen showed no abnormality on physical examination. An X-ray film of the chest was normal. Fusion of the third and fourth cervical vertebræ was present. An electrocardiogram was reported as showing probable arborization block. The speech had a nasal element and was limited in content. On neurological examination the only positive finding was some spasticity of the left leg. A gynæcological examination revealed complete absence of breast development and no pigmentation of the areola. The mons veneris was not developed at all and only a few sparse pubic hairs were present. The labia majora were flat and hairless, the labia minora appeared relatively hypertrophied and some slight clitoral enlargement was apparent.

On psychological testing she presented as a severely retarded girl, whose social age was approximatetly four years. With this degree of retardation she appeared sensitive and responsive and showed some degree of initiative. She was referred to the Commonwealth Acoustic Laboratory, which reported mixed hearing losses averaging 73 decibels in the left ear and 86 decibels in the right ear. On the Hiskey-Nebraska test she scored a learning age of approximately four years, which was regarded as a minimal figure. An electroencephalogram was reported as being grossly abnormal, the tracing being diffusely slow and dysrhythmic, and indicative of some form of cerebral dysgenesis. An X-ray film of the skull showed no significant abnormality. The results of the hæmatological examination were normal. Buccal smears showed 44% of chromatin-positive cells. No double Barr bodies were identified.

The patient is the first of four female siblings; the other three are in normal health. No history of developmental abnormality was obtained from the parents.

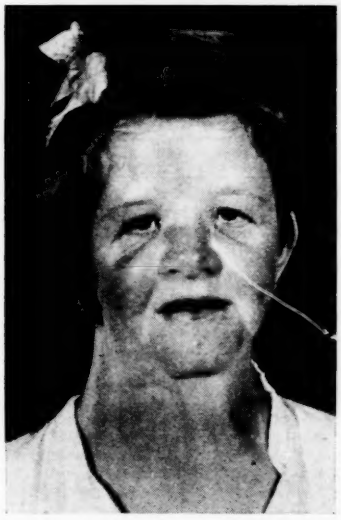

FIGURE I: The patient. Note the epicanthic folds and the webbing of the neck on the right side.

Chromosome Analysis.

Peripheral blood leucocytes were cultured and treated by a modified version of the method of Hungerford *et alii* (1959). Spreading was achieved by means of an air-drying technique and the chromosomes were stained by aceticorcein or a diluted Leishman stain.

The chromosomes of 60 cells, from four separate cultures, were counted and of these 58 cells gave chromosome counts of 46. The remaining two cells gave counts of 45, which on analysis showed a small acrocentric of Denver group 21 to 22 to be missing in one and one of the 6 to 12 group missing in the other. These two divergent counts were attributed to spreading artefact. Twenty-five cells, each containing 46 chromosomes, were selected for photography and analysis, and of these 14 were considered technically suited for detailed study and measurement (Table I).

In all the 25 cells in which the karyotypes were prepared, a constant abnormality was present. This consisted of the absence of one member of Denver pair 16, together with an additional chromosome which was at first believed to form an extra member of the 6 to 12 group (Figure II). However, on analysis, the additional member appeared to be a small chromosome with a length index (Denver) ranging from 35 to 40 (Table I), and a submedian centromere giving a centromeric index ranging from 1·8 to 3·0,

TABLE I.

The Relative Lengths (Denver) of the Chromosomes of the 14 Cells Analysed in Detail.

Chromosome Number. (Denver.)	Cell Number.														Range.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1	78	86	80	78	81	80	82	79	88	80	79	83	77	78	77–88
2	75	86	77	75	78	76	85	75	80	80	79	79	75	72	72–86
3	66	62	65	63	64	61	64	64	68	61	68	60	73	67	60–73
4	60	64	62	56	56	61	58	64	59	58	60	60	60	58	56–64
5	53	53	59	59	53	57	56	61	56	55	58	56	55	52	52–61
X	50	45	49	50	47	50	44	54	49	48	54	47	46	52	44–54
6	56	55	55	50	53	56	51	61	53	55	50	56	55	52	50–61
7	51	50	46	50	50	45	45	48	48	45	45	57	57	50	45–57
8	44	45	44	47	49	45	44	46	42	45	41	45	55	47	41–55
9	42	45	43	47	47	46	41	50	47	43	41	42	43	42	41–50
10	40	42	43	41	42	46	43	45	45	42	39	42	41	42	39–46
11	40	42	40	41	42	40	38	43	44	42	39	40	41	39	38–44
12	40	39	40	41	40	40	37	43	41	42	36	40	39	39	36–43
13	35	34	34	36	33	35	33	36	33	36	33	32	35	36	32–36
14	33	31	32	31	33	33	29	34	30	30	32	32	32	33	29–34
15	31	29	31	31	30	31	26	32	30	29	30	29	28	30	26–32
16	31	29	31	30	30	30	28	30	32	29	30	29	25	33	25–33
17	28	27	28	27	30	27	26	28	28	26	30	29	25	30	25–30
18	25	24	26	27	27	27	20	28	29	24	27	29	22	28	22–29
19	25	22	25	25	24	23	20	25	26	23	24	22	21	25	20–26
20	22	21	22	23	22	23	17	25	24	21	23	21	20	22	17–25
21	14	16	15	20	21	17	16	18	20	15	18	18	18	17	14–21
22	12	16	15	19	17	17	14	18	17	15	15	13	16	17	12–19
NR^1	37	38	37	38	36	37	35	37	36	40	36	39	32	41	32–41

which did not pair consistently with any member of the 6 to 12 group. In 18 of the 25 cells from which karyotypes were prepared this chromosome was found to have an abnormal morphology, the centromere being longer than normal, the long legs having an inverted V appearance. The abnormal morphology was so constantly present in this chromosome that it is considered to be more than a chance distortion. It is suggested that until further information is available concerning this chromosome, it should be referred to as NR^1, in accordance with the suggestion of the Denver Convention.

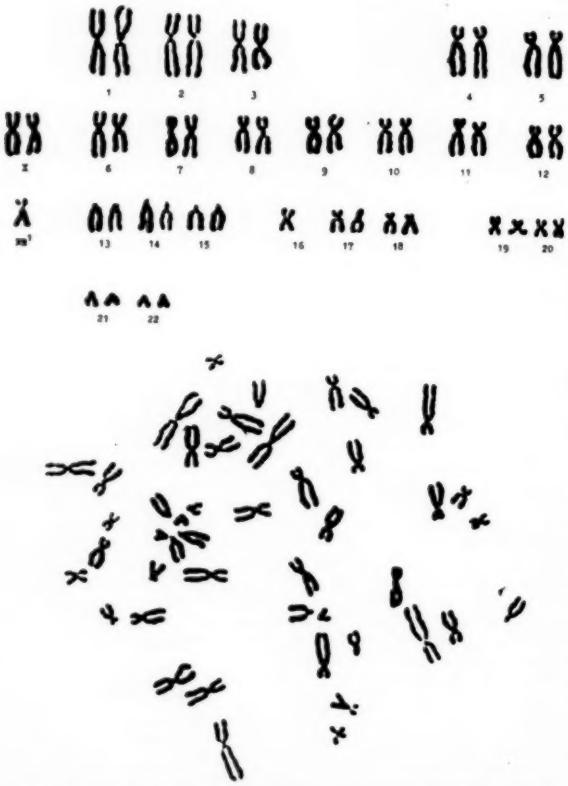

FIGURE II: The lower diagram represents the mitotic metaphase of cell 5 (Table I). The upper diagram represents the karyotype prepared from this spread and arranged in accordance with the Denver Convention.

Discussion.

This karyotype presents many interesting features. The monosomy for chromosome 16 associated with an apparent trisomy for one of the 6 to 12 group has at present no analogy in human cytogenetics. The position of the additional chromosome in the 6 to 12 group is difficult to decide. We believe that the small chromosome with the submedian centromere and a frequently abnormal morphology represents this additional member. However, in 13 of the 14 cells analysed in detail NR^1 was a shorter chromosome than chromosome 12 (Table I), and in each case it fell short of the range given by the Denver Convention for chromosome 12. The absence of double sex chromatin bodies in the buccal smears would seem to preclude the additional chromosome being interpreted as an X.

The mechanisms by which this chromosome might have arisen must be considered, and the following possibilities are proposed. (i) A double and reciprocal non-disjunction having occurred during meiosis, resulting in monosomy for chromosome 16 and trisomy for one of the 6 to 12 group chromosomes, could explain the present karyotype. The apparent inviability of human autosomal monosomy could have been offset by the presence of such additional chromatin material as is present in NR^1. (ii) A translocation on to one chromosome 16 of chromatin material from another chromosome, in a manner analogous to that proposed by Böök *et alii* (1960), must be considered. However, there is no demonstrable consistent lack of chromatin material on any other chromosome such as could be expected if this were so. Further, the lengths of the short arms of NR^1 and of chromosome 16 are unequal in all preparations. (iii) The frequency with which NR^1 has an abnormal morphology suggests that it may be a supernumerary chromosome (Swanson, 1958).

The origin and true position of NR^1 must remain in doubt, but these could, perhaps, be clarified if the parents and siblings became available for examination. If it is considered that this karyotype is the result of double non-disjunction, then this is the first autosomal monosomy described in the human.

It would be hard to evaluate, at this stage, to what degree the patient's intellectual retardation is due primarily to genetic factors and how much is secondary to institutional life from an early age, sensory deprivation from hearing loss and defects in communication due to the cleft palate. There is a considerable chance of a higher level of social adjustment when these handicaps are minimized with a bone-conductive hearing aid, attention to the palate and a specialized education programme.

The presence of neck webbing and genital infantilism in this little girl suggested a possible Turner's syndrome, and it is perhaps not unreasonable to suggest that the production of these defects is not solely dependent upon some defect of the XX system, but can also be evoked by a defect in chromosome pair 16. This lends weight to the suggestion that the integrity of human systems is dependent upon the action of multiple gene loci.

Summary.

1. A chromosome analysis of a girl, aged 14 years, presenting with genital infantilism, mental defect, deafness, webbing of the neck and other congenital anomalies, revealed monosomy for chromosome 16 and the presence of an additional chromosome in the 6 to 12 group.

2. The features of this additional chromosome are described and it is proposed that it should be designated NR^1.

Acknowledgements.

The permission of the Director of State Psychiatric Services to publish this paper is acknowledged. The medical superintendents of the Royal Alexandra Hospital for Children and the Mental Hospital, Stockton, kindly gave access to their records.

Invaluable technical assistance was given by Mr. V. C. Conlay and Mr. W. C. Thompson.

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Reviews.

Functional Neuro-Anatomy". By A. R. Buchanan, M.D.; 1961. Philadelphia: Lea & Febiger; Sydney: Angus & Robertson Ltd. 10" × 7", pp. 378 with illustrations. Price: 93s. 6d.

SINCE this work has run to four editions since 1948, it evidently meets a demand. As in previous editions reviewed in these columns, the author pursues a functional approach, following afferent impulses up to the cerebral cortex and efferent impulses down again. This is quite logical, but it brings the student immediately up against the intricacies of the nervous system at all levels before he has had an opportunity to study its structure; that is dealt with in the latter half of the book. This difficulty can, of course, be overcome in a teaching course, by arranging the preliminary sessions in such a way as to provide sufficient initial instruction to enable the student to cope. There is a good section on blood supply, and a useful atlas is appended. The bibliography is representative without being overpowering, and the index is quite extensive. The volume is well produced, as it should be in view of the price. The work as a whole does not differ significantly from previous editions. Some parts have been rewritten, some chapters rearranged and some of the figures simplified, but not all sufficiently—a few still contain too much detail. In sum, this is a useful adjunct to any course in neurology.

Eugene Wolff's Anatomy of the Eye and Orbit: Including the Central Connections, Development and Comparative Anatomy of the Visual Apparatus. Revised by R. J. Last; fifth edition; 1961. London: H. K. Lewis and Co. Ltd. 9¾" × 7", pp. 508, with 438 illustrations. Price: £4 4s.

THE fourth edition of this book appeared in 1954, the year of the sudden and untimely death of its distinguished author. It was reprinted in 1958, and now the fifth edition has been revised by R. J. Last, Professor of Applied Anatomy and Warden of the Royal College of Surgeons of England.

By those familiar with previous editions, few changes will be noted. Additions are small, but names have been altered to conform to current anatomical nomenclature. The book remains so much Eugene Wolff that the first person (as Wolff) is still used in the text. The spirit and pattern of Wolff's book appear to have remained with Wolff in 1954, without having progressed as they would have with Wolff had he been alive in 1961. In the intervening seven years extensive investigations have proceeded, especially on the drainage channels of the aqueous and the blood supply of the optic nerve. The presentation of these subjects appears to be as Wolff left them. Electron microscopy receives extremely brief mention, but not enough to appear in the index. Bibliographies are said to be brought up to date, but many important new papers are not listed.

Wolff's "Anatomy of the Eye and Orbit" is certainly "a unique and beautiful book", but its beauty must not be allowed to stay in a period. If Wolff's spirit is to be maintained, it must be a progressive spirit. Wolff was a fine teacher, and teachers of detailed anatomy need to be up to date. It is to be hoped that these conflicts will be resolved more adequately in the next edition.

Atlas of Obstetric Technic. By J. Robert Willson, M.D., M.S.; 1961. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical) Ltd. 10¾" × 8¼", pp. 304, with many illustrations. Price: £7 19s. 6d.

This atlas has been prepared by J. Robert Willson for the specific purpose of providing a reference for the management of unusual problems in labour and delivery. The accent therefore is primarily on those procedures which may be necessary to complete delivery, and with this in mind there is an extensive initial section on normal delivery. This is illustrated step by step, and each stage is described in great detail, with emphasis on those small practical points which lead to excellence in results.

This is followed logically by a chapter on shoulder dystocia, and in turn is described the management of the third stage of labour and of post-partum hæmorrhage. Packing of the uterus is illustrated; but in the text the author expresses the opinion that the resultant distension of the uterus will more likely promote than stop bleeding. Episiotomy and repair are illustrated and described with great care, and then follows a section on cervical and vaginal lacerations.

The possible mechanisms of delivery are described for most abnormal presentations and positions, and upon these the various techniques for delivery are based. There is a large section, carefully drawn and annotated, on forceps delivery, with refeernce to Simpson type and Keilland forceps. Axis traction forceps are not described. Breech delivery, normal and complicated, is illustrated beautifully, and it is of interest to note that external version is recommended, providing general anæsthesia is not used.

Induction of labour and the various types of Cæsarean section are described, and there is brief mention of placenta prævia and its conservative and operative management. The only destruction operation discussed is craniotomy.

This is primarily a pictorial presentation of obstetric technique, but the text abounds with sound advice and conforms to a very high standard of practice. The illustrations are excellent and reflect painstaking care in their preparation. It is not a textbook in the accepted sense, but fulfils its stated purpose and provides a valuable source of reference, not only for the practitioner, but also for teachers of the obstetric art and in turn their students.

Section Cutting in Microscopy. By H. F. Steedman, Ph.D.; 1960. Oxford: Blackwell Scientific Publications Ltd. 9" × 5½", pp. 178, with a few illustrations. Price: 20s. (English).

STEEDMAN'S vast practical experience is the basis of this remarkable book, which fills a gap in the literature on applied embedding and cutting. The accent is on embedding, which has been covered in an exemplary way; the immaterial is left out, and the facts are presented in a novel manner. Historical data included may at first seem to be superfluous in a practical manual of this size; but the main value of this review from development to tried-out schedules lies actually in its tremendous stimulating effect.

While compelled to follow this line of thought, the reader not only gains a much better understanding of the subject, but also has the opportunity to modify naturally the techniques to his own needs. This by no means applies to a histology technician alone. Newer developments in embedding media are covered sufficiently to be useful to electron microscopists, even though other information inserted for his benefit and of rapidly changing character may already be due for an overhaul; this applies particularly to the instructions on glass knife preparation, which omit the most important principle of free breakage along the glass tension lines.

It is inevitable that a book of this size must sacrifice a number of details. The actual use of vacuum treatment, the popular application of solder knife for trimming, the choice of automatic knife-sharpeners, the positioning of mounted sections for drying—all are examples of practical advice which a teacher in technology would like to see included. The processing routines are well-chosen examples. It is doubtful whether an average laboratory could afford to follow the time-consuming method of cedarwood oil removal with four paraffin baths, and interposed solvent baths should be discussed. The high section compression figures are not compatible with a laboratory familiar to us, where knives are kept in excellent condition by the use of lapping machines; but they may well apply to the average experience. Such minor shortcomings are compensated by adequately provided references.

Steedman's work should receive an enthusiastic reception among technologists. This concise yet inexpensive guide should not be missed by any laboratory which aims at efficiency and at consistent results in processing and cutting, particularly in Australia, which still suffers from deficiencies in technological education.

Orthopædic Approaches: A Stereographic Manual. Section 1: Lower Extremity. By J. J. Joyce, III, M.B., B.A., and Michael Harty, M.A., M.B., M.Ch., F.R.C.S. (Eng.); 1961. Baltimore: The Williams & Wilkins Company. 10" × 7", pp. 80, with illustrations and 18 stereographic reels. Price: £15 8s.

THIS book consists primarily of a collection of 18 reels of stereoscopic colour transparencies illustrating step by step the common surgical approaches to the lower extremity. The dissections which they illustrate are undoubtedly well done and neatly labelled, but the rather flimsy viewer provided is inconvenient to handle and does not provide sufficient magnification for easy identification of structures. Indeed, in many cases the labelling cannot be read. Some views are so placed that the patient appears to be standing up in front of the viewer, and the approach shown is therefore difficult to orientate. It is stated that with a suitable projector and screen and viewing glasses the transparencies may be used for group teaching, and it may be that here they would play a useful role. In the form as provided, it is not thought that they can be regarded as a serious method of gaining anatomical knowledge.

The text of 75 pages commences with a list of orthopædic principles which could not be bettered, and then tabulates the indications, limitations, danger points, etc., of each approach and makes brief reference to important points in each transparency. Perhaps the most valuable contribution in both illustrations and text is a concise account of the best methods of positioning the patient for each surgical approach. It is surprising how often this very important prelude to surgery is neglected by the surgeon or left to inexperienced assistants. The few illustrations of positioning and the line drawings of the various approaches are excellent.

This is a very expensive book (£15 8s.), and we think that if the text was provided without the transparencies and at half the price, it would be strongly recommended.

Orthopædics. By G. Perkins, M.C., M.Ch., F.R.C.S.; 1961. London: The Athlone Press. 9¼" × 6", pp. 990, with many illustrations. Price: £6 6s. net (English).

THIS large volume of almost one thousand pages by Professor George Perkins is the companion to the same author's "Fractures and Dislocations", published in 1958. In this new treatise, he reviews his lifetime's work as a clinician and teacher at St. Thomas' Hospital.

The book is true to title, in that an attempt is made to cover the whole field of orthopædic surgery. The arrangement is regional, with preliminary chapters discussing growth dystrophies, vascular lesions, inflammation and tumours. There is also a short but valuable chapter on manipulative surgery, a subject which has always enjoyed a big following at St. Thomas' Hospital. It has all the merits of a single-author text. The opinions given are clear, concise and dogmatic. In his discussion of common orthopædic conditions, Professor Perkins has made little attempt to quote alternative opinions; but one feels that the treatment chosen is based on wide experience and careful selection. Questions of ætiology and pathology are lightly passed over, and the special merit of the volume lies in the sections on recognition and treatment of orthopædic conditions, the detailed examination of special parts, and the numerous illustrations from life which are carefully integrated throughout the text.

This is a textbook which can be recommended with confidence to all final undergraduate students and will recall with pleasure to many post-graduates the author's outpatient teaching methods. Moreover, every orthopædic surgeon will find in its pages and pictures something new and controversial and stimulating. It is as easy to read as a good autobiography.

Meaning and Methods of Diagnosis in Clinical Psychiatry. By Thomas A. Loftus, M.D.; 1960. Philadelphia: Lea & Febiger; Sydney: Angus & Robertson Ltd. 9¼" × 5¾", pp. 170. Price: 55s.

THOMAS LOFTUS has written a small book of less than two hundred pages for the medical student, the psychiatrist in training and the general practitioner. Many, including physicians and psychiatrists, will heave a sigh of relief to find a psychiatric treatise almost completely free of speculation and theory. There is clear evidence that the writer has worked much in the consulting room and in the teaching of students—areas where speculation has a place, but where the real work must be done within the confines of an observable fact if psychological medicine is to be integrated with general medicine.

Loftus devotes a chapter to criticism of current difficulties in diagnosis, and stresses the fact that a diagnosis must be a working tool for therapy. Whilst there is little direct mention of therapy in the book, it is fair to conclude that his approach to therapy would be as eclectic as is his approach to diagnosis. Physical, biochemical and constitutional as well as psychodynamic factors are considered all on their merits, but each is emphasized only in so far as each particular factor appears to be relevant to a carefully taken longitudinal case history. The author clearly accepts and probably uses psychodynamic formulations in his work, but rejects a unilateral approach to diagnosis. The Freudian cornerstone of the libido theory, the concept

of the "mental apparatus" or in fact any diagnosis based on psychopathological theory alone, is disposed of in less than one page—a feat which is interesting, if not entirely convincing. The student of descriptive psychiatry will be intrigued to find the whole range of psychiatric syndromes described in about thirty pages, albeit with a crispness and economy of words which could well be emulated by a few other psychiatric authors.

Professor Loftus lays great emphasis on history taking, and is prepared to interpret only from objective or stated facts. The student is greatly assisted by reading exactly what the psychiatrist says and does during the taking of a history, which is carried out much along the same lines as a conventional medical history, but with a thoroughness and orientation which those general physicians who believe that psychiatric examinations and treatment involve no more than the application of "common sense" would do well to study.

Although the author states that clear-cut diagnoses are the exception, he justifies the diagnostic judgements he does make by an admirable system of case histories. These case histories are presented in such a way that the student can readily see a point-to-point correlation of the history with the diagnostic and therapeutic conclusions reached as the study of each case proceeds. At the end of the book case histories are presented in the form of exercises for students with suggestive diagnostic summaries appended.

This little book—which, incidentally, has an extensive bibliography—will do much to encourage the student and general practitioner to develop psychiatric insights by using an extension of his medical history-taking skills, rather than by approaching the problem with the belief that psychiatric diagnostic and therapeutic techniques represent a strange new form. Of course, one-school theorists of psychopathology will be irritated by the fairly eclectic and at times superficial approach, but little harm can come from that.

Atlas of Anatomy and Surgical Approaches in Orthopædic Surgery: The Lower Extremity. By R. Consentino, M.D., and a preface by C. B. Larson, M.D.; 1961. Springfield, Illinois: Charles C. Thomas: Oxford: Blackwell Scientific Publications: Toronto: The Ryerson Press. 11" × 8½", pp. 274 with many illustrations. Price: £5 12s. (English).

IN this age of multicoloured reproduction and drawing, in which the tendency is to make everything so clear that the result bears little resemblance to the original, it is refreshing to review a text such as this. Here we see black-and-white full-page photographs of dissections covering the whole of the anatomy of the lower limbs. These dissections can be described only as exquisite, for they create an atmosphere of life, and the effect is uncannily similar to the scene visualized by the surgeon operating in a bloodless field. The photographer has done full justice to this, and no surgeon, be he trainee or fully fledged, could fail to benefit from the study of these pages. The text is divided into regions, the anatomy of which is illustrated from various aspects and at different depths. The common surgical approaches to the region are then illustrated layer by layer, each important structure being labelled.

This book can be highly recommended.

Bleeding Syndromes: A Clinical Manual. By O. D. Ratnoff, M.D.; 1960. Springfield, Illinois: Charles C. Thomas; Oxford: Blackwell Scientific Publications Ltd.; Toronto: The Ryerson Press. 9" × 6", pp. 298. Price: 68s (English).

THIS book is an account of bleeding disorders for those not specializing in this field. The introductory chapters deal with the physiology of blood coagulation and general diagnostic considerations. The importance of the history is emphasized, and there is a short section on the use of laboratory tests. Then follows a series of chapters on disorders due to congenital and acquired deficiencies of coagulation factors, disorders due to platelet abnormalities and disorders due to vascular abnormalities. Particularly helpful are sections on fibrinogen deficiency states, purpura associated with dysproteinæmia, auto-erythrocyte sensitization, and hæmorrhagic states complicating blood transfusion; these are subjects of which it is difficult to obtain a succinct account elsewhere. There is a full list of general references, and each chapter is concluded with a list of selected references.

In the forword the author states that the book is "a compilation of practical information about the clinical picture, pathogenesis, diagnosis and treatment of hæmorrhagic diseases, written for the practising physician". He has succeeded in giving an excellent account of clinical picture, pathogenesis and diagnosis. However, although the principles of treatment are sound, the physician requiring detailed knowledge of the day-to-day management of a patient with a bleeding disease will not always be satisfied. For example, the treatment of hæmophilia and idiopathic thrombocytopenia purpura could, with value, be discussed in even more detail.

The style is readable and concise, and one must admire the author for the clarity with which he has dealt with an ever-changing and confusing subject. His considerable practical and theoretical knowledge is obvious. Although he states that the book reflects his accumulated prejudices, and this approach is necessary in a subject of this nature, he gives a fair account of opposing views on important topics.

This book should find a place in all libraries and will be most valuable for hæmatologists not specializing in coagulation disorders. The general physician who requires a book on bleeding disorders will also find it exceedingly helpful.

Essential Pathology. By Roger D. Baker, M.D.; 1961. Baltimore: The Williams & Wilkins Company. 7¼" × 5", pp. 638, with illustrations. Price: £5 4s. 6d. (English).

To write a small book on pathology, one must choose whether to try to write something about almost everything, with the result that the treatment must be superficial, or to pick out a much lesser number of important topics and discuss them a little more fully. Dr. Baker follows the former course. His first 13 chapters, totalling 318 pages, cover the principles of the subject, but very much more superficially than existing modern texts on "general pathology". Thus, for example, we are told that vessels dilate in inflammation, but we learn almost nothing about the fascinating modern work on the chemical factors responsible for this phenomenon. Phagocytosis is described, but its mechanism is not discussed. The specific actions of radiations on cells are given only a brief note, and theories of neoplasia are allowed only two pages.

The 305 pages and nine chapters of Part II (systematic pathology) cover the field in an equally brief fashion. Many quite rare conditions are noted, but often by definition only, though common and important conditions are more fully described. This is in accordance with the author's expressed aim to allot space in proportion to the frequency and severity of disease. Even so, the descriptions of common conditions are much briefer than in most standard texts. The illustrations of gross specimens are first class, though many of the photomicrographs lose impact through over-enlargement. There is a good index, and the printing and production are excellent.

The book would be useful as a "first reader" for students, to provide a bird's-eye view of the subject, though its high price is a drawback. It is certainly not detailed enough to serve as the sole text for undergraduates in any Australian medical school.

Clinical Hæmatology. By Robert Duncan Eastham, B.A. (Cantab.), M.D. (Cantab.), D.C.P., Dipl.Path.; 1961. Bristol: John Wright & Sons Ltd. 7" × 4", pp. 162. Price: 15s. 6d. (English).

THIS small paper-backed book, obviously intended to be carried in the pocket of a white coat and whipped out and consulted at all times, contains a vast amount of up-to-date information, efficiently and precisely presented. It consists of six sections: (i) hæmoglobin and associated pigments; (ii) red blood cells; (iii) anæmia; (iv) peripheral white blood cells; (v) bone marrow; (vi) bleeding, clotting and transfusion. The first section includes, in tabulated form, the normal ranges of whole-blood hæmoglobin, plasma hæmoglobin, mean corpuscular hæmoglobin, blood volume, blood viscosity, hæmoglobin-oxygen dissociation curve and blood oxygen content; each topic being followed by a summary of variations from the normal and the principal causes thereof. The section is completed by tabulated information on abnormal blood pigments, hæmoglobin abnormalities and plasma hæmoglobins. Succeeding chapters follow much the same plan, the relevant laboratory findings being included in each case. Directions for performing these tests are not included, and their limitations and relative importance are not dealt with. The author, who is Consultant Pathologist to the Frenchay-Cossham group of hospitals, Bristol, states in his preface that this book is not intended to replace standard laboratory textbooks. It contains no illustrations of any kind. In spite of its small size, it is by no means elementary, and it includes many new tests which are not as yet performed in routine labora-

tories. While it is undoubtedly useful to have so much information readily available and so efficiently set out, a book such as this should be used only in conjunction with standard textbooks on hæmatology and in the light of clinical experience. A number of useful references are included in the text, and there is an adequate index.

Pathogenesis and Treatment of Cerebrovascular Disease: Seventh Annual Scientific Meeting of the Houston Neurological Society, Texas Medical Centre, Houston, Texas. Compiled and edited by W. S. Fields; 1961. Springfield, Illinois: Charles C. Thomas; Oxford: Blackwell Scientific Publications. 9" × 6", pp. 562, with illustrations. Price: £6 (English).

THIS volume is the fifth in the series of published symposia of the Houston Neurological Society. It is a compendium of the reports and discussions on the pathogenesis and treatment of vascular disasters to the brain. The 20 separate topics—discussed by eminent contributors—cover most of the current aspects of the wide field suggested by the title.

The book opens with a useful account of the anatomy and embryology of the brain's vasculature, both arterial and venous. The stage is then set for the next section of 11 articles dealing with the pathogenesis of atherosclerosis, the physiology of the cerebral blood flow and the mechanisms of thrombosis. In this part there are the papers by Raymond Adams on the principal causative factors in the pathology of cerebral arterial occlusion. This is a scholarly presentation, which is both critical and interesting, and which refers in particular to the possible role of hypertension and diabetes in the genesis of atherosclerosis. Another valuable paper is that of Clark Millikan on the medical treatment of cerebral infarcts, with special reference to the use of anticoagulants. This is followed by a discussion by Crawford and DeBakey of the various reconstructive techniques which may now be employed in disease of the internal carotid, vertebral or subclavian arteries.

This part is followed by articles by Millar Fisher concerned with the pathological lesions and clinical syndromes consequent on intracerebral hæmorrhage. The value of neurosurgical intervention in intracerebral hæmatomas is fully covered by Snodgrass. Finally, under the heading "Subarachnoid Hemorrhage and Intracranial Aneurysms" there are chapters on angiography, hypothermia and the relative merits of intracranial and extracranial surgical procedures. This is the weakest part of the book and contains many loosely supported opinions and speculations, and the discussions at the end of the papers are exceedingly uneven. In particular, the comments by Sweet on the surgery of cerebral aneurysms should have been subjected to ruthless editorial cutting.

Whilst the editors have contrived to review a large amount of material and have provided an interesting and up-to-date compendium of one of the most important aspects of contemporary medicine, not all the topics are treated with equal authority, and there are several surprising omissions. For example, no mention is made of the rehabilitation team —the speech therapist, the occupational therapist and the physiotherapist—and their valuable role in the treatment of the patient with a stroke.

Despite this lack of balance, we think that all those working in this field will find much in this book that is helpful and interesting.

Ocular Vertical Deviations and the Treatment of Nystagmus. By J. Ringland Anderson, M.C., M.D., B.S., F.R.C.S.Ed., F.R.A.C.S., D.O.M.S., with a foreword by Sir Stewart Duke-Elder, G.C.V.O., M.D., D.Sc., LL.D., F.R.C.S., F.R.A.C.S., F.A.C.S.; second edition; 1959. London: British Medical Association. 9¾" × 6¾", pp. 206, with 60 illustrations. Price not stated.

THE second and enlarged edition of this book contains much new material, and in addition there is now a section on the surgical treatment of congenital nystagmus.

The text is divided into 10 sections, and deals with types and causes of vertical deviations, disturbances of vertical movements, the anatomy and actions of the ocular muscles, palsies of ocular muscles, investigation of vertical deviations, prognosis and treatment of vertical deviations and the surgical treatment of congenital nystagmus. There is a small section on the "A" and "V" syndromes, which is a summary of the literature to the time of writing. The author, in keeping with other workers, is unable to be certain of the explanation or the correct treatment of these defects. Besides drawing on his own experiences, he summarizes the literature on this subject, there being references to over 200 papers. There are 60 illustrations of good quality to illustrate the text.

This monograph will remain a memorial to the late J. Ringland Anderson, and should be in the possession of all practising ophthalmologists.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"The Theory and Practice of Public Health", edited by W. Hobson, B.Sc., M.D., D.P.H.; 1961. London, New York, Toronto: Oxford University Press. 11" × 8¾", pp. 354 with figures. Price: 86s. 3d.

"The Proceedings of the Medico-Legal Society of Victoria during the Years 1957, 1958 and 1959", edited by G. H. Lush, LL.B., Q.C., and Bryan Gandevia, M.D., M.R.A.C.P.; Volume 8; 1961. Melbourne: Brown, Prior, Anderson Pty. Ltd. 8½" × 5½", pp. 194. Price not stated.

"Official Year Book of Western Australia, 1960, No. 2 (New Series"; Commonwealth Bureau of Census and Statistics, by R. J. Little; 1961. Western Australia: Commonwealth Bureau of Census and Statistics. 9½" × 6", pp. 414. Price not stated.

"Cerebral Infarction: The Rôle of Stenosis of the Extracranial Cerebral Arteries", by P. O. Yates and E. C. Hutchinson; Medical Research Council Special Report Series No. 300; 1961. London: Her Majesty's Stationery Office. 9¾" × 6", pp. 96 with illustrations. Price: 14s. net (English).

"Fellowship Examination Papers for the Diplomas of the Royal College of Surgeons, Edinburgh, 1956-1961"; 1961. Edinburgh: E. & S. Livingstone Ltd. 7¼" × 5", pp. 56. Price: 5s. 6d. net.

"Research in Physiopathology as Basis of Guided Chemotherapy with Special Application to Cancer", by Emanuel Revici, M.D.; 1961. London, Toronto, New York, New Jersey: D. Van Nostrand Company, Inc. 9¼" × 6", pp. 772 with illustrations. Price: £9 (English).

"The Exercise Electrocardiogram in Office Practice", by E. G. Dimond, M.D., F.A.C.P.; 1961. Springfield, Illinois: Charles C. Thomas; Oxford: Blackwell Scientific Publications. 8" × 10½", pp. 170 with illustrations. Price: 80s.

"An Introduction to Fundamental Anatomy", by David Sinclair, M.A. (Oxford), M.D. (St. Andrews); second edition; 1961. Oxford: Blackwell Scientific Publications. 8¾" × 5½", pp. 448 with illustrations. Price: 42s.

"Year Book of Cancer, 1960-1961 Series", compiled and edited by R. L. Clark, jr., B.S., M.D., M.Sc. (Surgery), D.Sc. (Hon.), Houston, Texas, and R. W. Cumley, B.A., M.A., Ph.D., Houston, Texas; 1961. Chicago: Year Book Medical Publishers; Sydney: W. Ramsay Surgical (N.S.W.) Pty. Ltd. 7¾" × 5", pp. 540 with illustrations. Prce: £4 13s. 6d.

"The Use of Drawing in the Study of Anatomy and Physiology", by C. R. Bannister, M.C.S.P., with a foreword by J. L. Stephen, M.A., Ch.M., F.R.C.S.; 1961 Edinburgh, London: E. & S. Livingstone, Limited. 11" × 8¾", pp. 40 with many illustrations. Price: 17s. 6d. net.

"Chemistry of Cancer Toxin Toxohormone", by Waro Nakahara, Ph.D., M.D., and Fumiko Fukuoka, M.D.; 1961. Springfield, Illinois: Charles C. Thomas; Oxford: Blackwell Scientific Publications. 9" × 6", pp. 76. Price: 34s.

"Atlas and Demonstration Technique of the Central Nervous System", by J. B. McCormick, M.D.; 1961. Springfield, Illinois: Charles C. Thomas; Oxford: Blackwell Scientific Publications. 8½" × 11", pp. 100 with many illustrations. Price: 90s.

"Obstetrical Endocrinology", by José Botella-Llusiá, M.D.; 1961. Springfield, Illinois: Charles C. Thomas; Oxford: Blackwell Scientific Publications. 9" × 6", pp. 130 with illustrations. Price: 52s. (English).

"Current Trends in Analytical Psychology", edited by Gerhard Adler; 1961. London: Tavistock Publications. 8½" × 5½", pp. 314 with plates. Price: 38s.

"Night Calls: A Study in General Practice", by Max B. Clyne, M.D., with an additional chapter by Aaron Lask, M.A., M.R.C.S., D.P.M., and with a foreword by Michael Balint, M.D., Ph.D., M.Sc.; 1961. London: Tavistock Publications. 8½" × 5½", pp. 208. Price: 21s.

"Somatic Stability in the Newly Born", A Ciba Foundation Symposium, edited by G. E. W. Wolstenholme, O.B.E., M.A., M.B., M.R.C.P., and Maeve O'Connor, B.A.; 1961 London: J. & A. Churchill Ltd. 8" × 5½", pp. 394 with a few illustrations. Price: 50s. net (English).

The Medical Journal of Australia

SATURDAY, NOVEMBER 18, 1961.

MIDDLE AGE.

> IF you could peel the years from a man's life, as you do the leaves from a globe artichoke, you would find him having his happiest time between the ages of fifty and sixty-five.
>
> The awful anxieties of youth have resolved themselves—he no longer jumps at shadows . . . competitors are not treading upon his heels . . . achievement has not yet lost its glamour . . . ultimate success, glorious and satisfying, lies just around the corner. . . .
>
> A golden, mellowing period which brings out all that is best in a man. Kindliness creeps in; cheerfulness spreads its warming rays; even a little humour. . . .
>
> —REGINALD ARKELL, *Old Herbaceous.*[1]

As a glimpse of the experience of later middle age, Reginald Arkell's reflection of the thoughts of an old gardener tells an important part of the truth. For some it is sadly or desperately or bitterly not true at all, but for many it is the very essence of the matter. For none, of course, is it the whole truth. And when we have added to it and subtracted from it and qualified it, we still have to take into account the usually quite different experience of the preceding decade if the whole picture of middle age is to start to emerge. That it is an important picture to examine we can scarcely deny, but whether we have thought about it enough is another matter. In medicine it poses major problems, yet we have not given it the close and specialized attention that has been thought proper for the very young, the adolescent and the aged. No doubt a special label helps in attracting attention to a phase of medical care—pædiatrics we know, geriatrics we are coming to know, and several terms have been suggested for the care of the adolescent, though none has managed to stick firmly as yet. It is not surprising then that when a short while ago *Punch* turned its all-embracing eye to the care of the middle-aged group, the term "mediatrics" emerged. Not that we want another specialty. This is very much the responsibility of the general practitioner, with the consultants on call as required. But the term "mediatrics" is as good a label as another (with appropriate bows to Mr. Punch and more particularly to H. F. Ellis) and serves to focus our attention on a somewhat neglected age.

To K. Annis Gillie[2] middle age is also "the awkward age". The description is perhaps more familiar as applied to adolescence, but what makes the teenager awkward has certain parallels in middle age. Certainly both are stages of transition, which is surprisingly often as bewildering in the one as in the other despite differences of experience and maturity. The difficulty here does not lie only with the individual. It involves the onlooker and society as a whole. The plaint of the teenager is familiar: "One minute you insist on treating me as a child. The next you insist that I behave as an adult. Which am I?" Not dissimilar is the problem, especially in later middle age, of reconciling the expression of maturity and continuing vigour of mind with slowly lagging physical resources, often accentuated by pressures from the vigorous up-and-comings, impatient for their place in the sun. For the successful it is not easy to accept the assertion, open or implied, that having arrived one should forthwith prepare to depart. For the less successful and the failures, the desire to hang on may be stronger, whether or not lingering hope of success has given way to resignation of cynicism or even frustration and self-pity.

Of course, as generally defined, middle age is a much longer period than adolescence and may bring a wider variety of experience, but somewhere along the way the scene changes. "There comes a time to the consciousness of many men and women", Annis Gillie writes, "when the watershed of life is felt to be crossed. Stretching beyond the watershed there may be a long plateau of activity, ending perhaps in a sharp cliff—or perhaps the remaining span of life can be likened to an undulating range of foothills beneath a mountain pass of success. In others again there is a steady downward slope." How this will be is mostly beyond either the individual or his medical adviser to foretell. The right attitude would certainly not seem to be a slightly fearful, slightly hostile daily looking to see if one has suddenly become a "has been". For most this will not come until the later part of middle age, and for some it will not come even then. More to the point is a reasonable assessment from time to time, without too much introspection, of one's physiological income. Mr. Micawber's dictum is well known: "Annual income twenty pounds, annual expenditure nineteen nineteen six, result happiness. Annual income twenty pounds, annual expenditure twenty pounds ought and six, result misery." Fortunately the bodily economy allows a little more elasticity than this, but those who try to live on a sustained overdraft sometimes find the interest rate rising with a curious steepness, and bankruptcy can come suddenly and terribly. Wisely husbanded the bodily resources of most people can make the years of their middle age fruitful, satisfying and useful—and what may be more important, of the greatest value and acceptability to their fellows.

In all this the medical adviser has a clear responsibility. Annis Gillie, who is an experienced and respected general practitioner, discusses a number of the medical problems, physical and psychological, of particular significance in middle age and can well be heeded. There is room for more such carefully recorded clinical experience. At the same time more fundamental knowledge is needed of some of the physiological and pathological problems involved in such matters as weight gain, alterations in body

[1] Michael Joseph, 1950: 105.
[2] *J. Coll. gen. Pract.*, 1960, 3: 397 (November).

chemistry, and cardio-vascular changes in the middle-aged group. Dr. Gillie puts in a plea for more attention to the matter from both clinician and academic investigator. This is not a fuss over trifles, but the expression of a significant need. It is apparent that this group presents its own peculiar medical posers, and few would dispute Dr. Gillie's assessment of its importance in the community:

> The contribution to society of men and women of middle age means that their individual wellbeing, the physiological changes involved and the stresses of life upon them have become of more than personal importance to themselves. It is tragic that the McIndoes of this profession should drop out of life when they still have so much to give. None of us wants to drag on into prolonged senility but we do want to have and to give the best in our middle years, and not only to feel that "Just when we think we have settled our account, Life presents a new one more difficult to pay" (to quote again T. S. Eliot in *The Confidential Clerk*).

RESUSCITATION AND CARDIAC MASSAGE IN EMERGENCIES.

FROM the beginning of historical record men have been intrigued by the possibility of reviving the apparently dead. However, it was only fairly recently that the medical profession came to find that a still heart could be made to pulsate again and to circulate warm blood through what might have been a lifeless body. This was a dramatic procedure. Provided the circulation had not stopped for too long, a normal resumption of life could be anticipated. Mostly the patient was on the operating table and for one reason or another had collapsed. The chest was opened in haste and the heart massaged directly or stimulated by an electric current. In some few cases the opportunity occurred to revive a person who had collapsed in other circumstances. For example, there is the story of a physician who entered a clinic for investigation of his personal health. He obtained his verdict, walked out of the door, and dropped dead. He was immediately seized and taken to the operating theatre, where an enthusiastic surgeon opened his chest forthwith and stimulated his heart to contract. The idea became current that if a skilled operator were quickly available, it might be possible to save many a person whose heart had suddenly stopped. But thoracotomy is a measure of desperation and is itself attended by various dangers, such as pulmonary collapse, hæmorrhage and sepsis. Manual massage may cause gross contusion of the heart and destruction of cardiac muscle, as may be seen at autopsy when resuscitation has failed or has been only partly successful. It is not unknown for a coronary artery itself to be damaged (even divided) in the course of the operation. This possibility of surgical damage gives rise to the thought that on revival a person might be thought to have collapsed because of myocardial infarction, whereas in truth he has collapsed from some other cause, and damage shown electrocardiographically is iatrogenic. Nevertheless, as with other desperate measures, risks such as these are not necessarily contraindications. The important thing is that they be known and borne in mind.

The ultimate in surgical resuscitation is reached when a layman opens a person's thorax with a pocket knife on the highway or the byway and directly massages the heart with a hand that can hardly be regarded as clean. This heroic procedure demands either great courage or exhibitionistic foolhardiness. It may on occasion merit our admiration, but we can hardly do other than question its necessity or advisability. Even in medical hands it cannot be regarded as more than a gesture, which the great majority of doctors would prefer not to make. Certainly it should never be regarded as what is to be expected from the doctor in the emergency outside hospital, whether by the onlooker or by a more responsible authority such as the coroner. The fact that occasional newspaper stories record a successful outcome of such measures, with its drama of thoracotomy, cardiac massage and an ambulance dash with police protection to hospital, does not alter the situation. It seems likely that the patient who survives such an assortment of injuries was, in fact, never dead, and that the heart would have picked up its rhythm given time.

Cardiac activity and efficiency are a complex of many factors intrinsic and extrinsic to cardiac muscles. The heart must fill with blood before any can be pumped into the arterial circuit. The heart muscle must then contract fully and completely in order to empty the ventricle completely. The heart must be in optimum condition for efficiency. Its muscles must not elongate, and the whole mass must contract synchronously. The rôle of cardiac resuscitation is very largely to prevent dilatation of the heart while maintaining a peripheral blood flow to carry oxygen to the vital centres of the brain and kidneys. If the heart is capable of contraction, this will usually occur spontaneously — though occasionally the onset of fibrillation demands electrical defibrillation. Thoracotomy in itself does nothing to enhance the chances of survival, and it may be disastrous by virtue of its removal of negative pressure on the chest and consequent lack of filling of the venæ cavæ and right auricle.

What the surgeon does in the emergency in the operating theatre is largely his affair. It will be determined by his own training, experience and convictions, and thoracotomy presumably still has its place here. Otherwise the answer lies in the technique of external cardiac resuscitation fully described by John Read in a paper in this issue (see page 842). This paper was prepared at our request because of the considerable current interest in resuscitation and will, we hope, put the whole matter into perspective for the practising doctor. As well as dealing with circulatory arrest Dr. Read discusses respiratory arrest, and here his views are reinforced by those of Professor C. R. B. Blackburn, who is able to quote the recommendations of the Medical Section of the International Convention on Life-Saving Techniques which met in Sydney last year. It is as well to note here that a restrained view is put forward. A certain amount of recent publicity would suggest that expired air respiration is the only acceptable method and that the older methods of artificial respiration are to be discarded. The recommendations quoted by Professor Blackburn do not go as far as this, though they do grade the usefulness of various methods. It is right that medical practitioners should become skilled in the technique of the use of expired air

respiration and should perhaps expect to employ it as a routine. But its indiscriminate use by the population at large is open to criticism, as D. K. Grant has pointed out.[1] One cannot discard out of hand the view that, in Grant's words, "the intensely close human contact necessary for mouth-to-mouth breathing is repulsive, disturbing and threatening to the average person". At the same time, many people are already trained in the use of manual methods, and it is better that they should use what they know than that they should feel obliged to use what they feel they should know. Grant points out that the intense publicity given to the "new" expired air method of resuscitation has led to potentially disastrous ambiguity in the efforts of would-be rescuers. In some instances rescuers have tried to use mouth-to-mouth resuscitation, about which they have heard so much; then finding that this was ineffective, have switched to manual methods with which they were more familiar. It seems to us that Grant is right in urging that rescuers should use that method of resuscitation with which they are most familiar. There is little doubt that the tried methods of manual artificial respiration have saved many lives in the past and will probably continue to have a place in general use—and this without any adverse reflection on the efficiency of expired air respiration properly used. For the medical practitioner Dr. Read's programme is comprehensive and sufficient. It warrants careful study and adoption in practice.

Comments and Abstracts.

THE MEETING OF THE NATIONAL HEALTH AND MEDICAL RESEARCH COUNCIL.

A NUMBER of matters of wide practical interest were considered at the meeting of the National Health and Medical Research Council held on November 2 and 3, 1961, at Canberra, according to information which has been made available by the Minister for Health, Dr. D. A. Cameron.

One item of topical interest was a request by the Council to its Nutrition Committee to examine the conditions of sale of vitamin preparations in Australia and report to its next meeting in May, 1962, on the desirability or otherwise of uniform action by the Commonwealth and State Governments to restrict their sale. Several members of the Council expressed the opinion that a problem had developed requiring action, possibly setting a guide to the limits of the amounts of vitamins that should be included in preparations prescribed for over-the-counter sales.

Dr. Cameron said that the Council had reported that an authoritative statement had been prepared on hepatitis, with particular reference to diagnosis, notification, the handling of contacts and the use of gamma globulin. This will shortly be published in this Journal.

Machinery has been set up that will permit the long range survey of traffic accidents decided upon by the Council at its meeting in May, 1961. The Traffic Injury Research Committee reported that it was receiving excellent cooperation from a number of State authorities whose assistance it had enlisted. The Council adopted a resolution that Commonwealth and State Governments should be asked to install safety belts in their own motor vehicles as a means to encouraging their use by motorists as a whole. The members of the medical profession might well take a lead from this and set the same sort of example.

[1] *Canad. med. Ass. J.*, 1961, 84: 893 (April 22).

The difficulties associated with infection carried by desiccated coconut, more particularly typhoid fever, were mentioned. The Council was informed that measures proposed to the Government of Ceylon to ensure the hygienic manufacture of desiccated coconut were expected to be enforced throughout Ceylon by December 1, 1961.

One matter that has greatly concerned the practising medical profession was brought forward. This was the question of the storage of vaccines and biological products in warehouses and pharmacies. The Council requested its Public Health Committee to examine and report on the conditions for this storage. Members stressed that it was necessary that wholesale premises and pharmacies should possess refrigerated equipment maintaining temperatures between 0° and 5° F.

There will probably be little surprise at the announcement that the Council has adopted a resolution expressing the opinion that a mass immunization campaign against influenza is not at present warranted.

A matter that will bring general satisfaction is the announcement by the Minister that an agreement has been reached between the National Health and Medical Research Council and publishers, advertising agents and the pharmaceutical industry on a voluntary advertising code to be used as a guide to manufacturers and advertisers in the advertising of proprietary medicines. Dr. Cameron said that proprietary medicines, for the purposes of the code, were medical preparations sold over chemists' and other store counters without a doctor's prescription. The Council had conveyed to the Minister its appreciation of the cooperative approach adopted during the discussion by all the interests concerned. The code was based on conditions already applied by the publishing and advertising industries, but it incorporated a number of new requirements to bring it into line with current medical practice. The new code would be substantially in line with the authority exercised by the Commonwealth over radio and television advertising, which was covered by the *Broadcasting Act*. Newspaper and other published advertising, Dr. Cameron explained, was subject only to State control. The aim of the discussions had been to attain a uniform code relating to publishing which the industries concerned would apply voluntarily throughout the Commonwealth. The essential features of the agreement would be to preclude the publishing of false or misleading claims for proprietary medicines, exaggerated claims, or the use of unacceptable words or illustrations. Money-back guarantees would also be precluded. The code would be administered by a censor appointed by the industries concerned and would be revised every five years or as required by the agreement of all parties.

Up till now the National Health and Medical Research Council has adopted a somewhat cautious attitude towards the fluoridation of public water supplies, adhering to a resolution which it passed in 1953 to the effect that a large proportion of the community should desire fluoridation before it was adopted, or alternatively a substantial proportion of the community should not be opposed to it. At this recent meeting the Council decided to rescind this resolution, and to recommend that public authorities throughout Australia should give early consideration to the necessity to fluoridate their water supplies. The relevant words of the latest pronouncement are as follows: "The Council notes that fluoridation of public water supplies has been shown in a number of countries to result in a significant reduction in dental caries in the population supplied, and that the procedure is safe. The Council recommends that public authorities give early consideration to the necessity for fluoridation of their water supplies." The Council adopted the following further resolution: "Fluorides used in other forms, such as in dentifrices, etc., are not a substitute for water fluoridation, which is the most effective means of utilizing the decay-preventive action of fluoride." The Council discussed at length the use of fluoride in toothpastes. The meeting was informed that one toothpaste containing fluoride, marketed in the United States, had been endorsed by the American Dental Association as being capable of retarding dental

decay. This dentifrice was not on sale in Australia. The Council expressed the opinion, by resolution, that there was insufficient evidence before it to suggest that fluoride added to dentifrices at present on sale in Australia improved their efficiency as a means of preventing dental decay.

UNDERWATER SWIMMING AND LOSS OF CONSCIOUSNESS.

IN view of the increasing popularity of underwater swimming in this country it surely behoves every practising doctor to acquaint himself with the special hazards of this sport and the treatment of their consequences. An understanding of respiratory physiology and the alteration in normal mechanisms which takes place in such altered conditions is a vital part of this knowledge, especially since preventive measures have more chance of success if based on sound physiological principles. In a recent article[1] Albert Craig quotes the figure 7000 for the number of deaths from drowning occurring each year in the United States of America; this figure immediately inspires some mental arithmetic on the part of the Australian reader. Craig investigates the sequence of events in a number of experienced swimmers who lost consciousness under water, and postulates this as an explanation for many unexplained drowning accidents.

All these swimmers were attempting to cover specific distances under water, and all hyperventilated considerably before beginning their swim; all "felt wonderful", and as if they could go on swimming "forever". When the urge to breathe was felt (as it was quite late in the swim) different manœuvres, such as "pumping the lungs" or swallowing, were employed to counter the urge, and the swimmer was able to carry on further without making respiratory movements. No warning was experienced of approaching unconsciousness, and in some cases coordinated movements continued well after the subject lost consciousness, so that the swim was completed. In one or more instances the swimmer climbed out of the water unaided, but later could not recall having done so, and in the other cases he was brought in and revived. In no case did water appear to have entered the lungs, and no cough or spluttering occurred when respiratory movements recommenced.

The explanation of the loss of consciousness occurring before respiratory movements were made may be that in humans a decreased partial pressure of oxygen contributes little to the respiratory drive, so that the partial pressure of oxygen may decrease to levels incompatible with cerebral function before the partial pressure of carbon dioxide makes breathing inevitable. This state of affairs is brought about by two facts: (i) exercise seems to increase tolerance to hypercapnia, so that the partial pressure of carbon dioxide (pCO_2) in the blood may rise to very high levels before the swimmer feels impelled to surface; (ii) hyperventilation before the period of apnœa induces a state of hypocapnia, so that the pCO_2 is still at a relatively low level when the partial pressure of oxygen (pO_2) is decreased to a level incompatible with cerebral function. Circulatory changes are not believed to play very much part in the phenomenon, since faints from hypotension usually give several seconds' warning, which was notably lacking in all the cases described.

Suggested practical applications of this conclusion are the discouragement of hyperventilation as a preliminary to underwater swimming and of disregard of the urge to breathe, an important built-in safety measure which the competitive swimmer should not ignore.

[1] *J. Amer. med. Ass.*, 1961, 176: 255 (April 29).

SHORTER ABSTRACTS.

SURGERY.

STUDIES ON PATIENTS WITH ARTERIOSCLEROTIC OBLITERATIVE DISEASE OF THE FEMORAL ARTERY. R. Warren *et alii*, *Surgery*, 1961, 49: 1-13 (January).

THE authors point out that the publishing of experiences with new methods of arterial reconstruction as they appear necessitates a standard method of reporting results. The statistical methods for appraising cancer therapy were not standardized until the five-year survival rate was established. The authors hold that it is time that the study of this other major degenerative disease should also become standardized. They urge a further major effort in the development of improved arterial prostheses in vascular disease. From their experience in observing the lesions which develop in reconstructed segments of diseased arteries, they have been impressed by the fact that the margin between success and failure, with the possibility of worsening of the circulation in the limb after the insertion of a prosthesis, is a narrow one. They consider that an ideal prosthesis should be developed which would allow surgeons to operate with safety, not only on patients with threatened limbs, but also on those with claudication only, and perhaps even to move into the field of prophylactic surgery for lesions not yet symptomatic. They consider that neither of the last two indications can be admitted at the present time for insertion of a prosthesis in the peripheral vascular system.

NECROSIS FROM SNAKE-BITE. Cl. Chippaux *et alii*, *Presse méd.*, 1961, 69: 583-586 (March 18).

THE authors present 12 cases of necrosis resulting from snake-bite in tropical areas; six cases occurred in Africa and six in Indo-China. Impaired function resulting from such necrosis is very frequent. In their 12 cases, the authors had to perform two thigh amputations, two arm amputations, one forearm amputation, one disarticulation of the arm, five finger amputations, and one plastic operation with skin grafting over a wide area. The lesions were massive dry gangrene, with black mummification, often complicated by ascending infection. The ætiology of the gangrene is discussed; it was not due to the tourniquet, but arose as a direct result of the envenomation through its necrosing action on the vascular endothelium, its action on blood coagulation, the blocking of venous circulation by œdema under tension and the direct necrosing action of the venom on striped muscle fibres. A vasoconstrictor effect was an aggravating factor in certain cases. The gangrene was ischæmic and fulminating. Sloughs were visible by the third or fourth day. The snakes implicated were not seen by the authors, but were believed to be species of Viperidæ. Most of the patients were first seen some considerable time after infliction of the bite, when gangrene was already established. The patient's generally grave condition sometimes required resuscitation before amputation was considered; the level at which amputation was performed was determined by the ischæmic and infectious lesions. The authors advise that the surgical procedure must be carried out carefully, with straight dressing and secondary suture. There were no deaths.

THE PREPARATION FOR AND THE RESULTS OF SURGERY IN MYASTHENIA GRAVIS. M. J. Lange, *Brit. J. Surg.*, 1960, 48: 285-291 (November).

THE author has reviewed 182 patients who underwent thymectomy for myasthenia gravis. Of these 25 (or 13·7%) had tumours. The diagnosis and differential diagnosis are discussed and the pre-operative and post-operative care is fully indicated. The author concludes that in our present state of knowledge there is little doubt that surgery offers a better prognosis than purely medical treatment.

AN EVALUATION OF THE LONG T-TUBE. R. B. Cattell and J. W. Braasch, *Ann. Surg.*, 1961, 154: 252-254 (August).

CATTELL introduced the long T-tube in 1946 and it is most commonly used after dilatations or transduodenal section of the sphincter of Oddi. This maintains the increase in the aperture at the ampulla of Vater during the healing period. Its use is also indicated after dilatation of malignant non-resectable strictures of the biliary tract, after certain end-to-end repairs of benign strictures of the biliary tract, and to protect the common duct during resection of low-

lying duodenal ulcers. After its use in the treatment of stenosis of the sphincter of Oddi it is recommended that the tube be left in place for a period of two months without irrigation. In stricture repair it should remain in place for a period of 6-12 months with two irrigations daily. Since the first description of the tube reports have appeared in the literature recording the occurrence of post-operative pancreatitis said to result from the use of a long tube. The authors have made a study of the incidence of pancreatitis after the use of the long T-tube in biliary tract procedures, and in 535 patients post-operative pancreatitis developed in five (0·9%). This was comparable to the incidence of post-operative pancreatitis in 637 patients after similar procedures where no T-tube or a standard-length short-limbed T-tube was used; among these, four patients (0·6%) developed this complication. The authors conclude that the development of pancreatitis after biliary tract surgery is related to manipulation of and dissection around the pancreas during the operation. In addition, it is possible that a false passage made through the head of the pancreas by a probe or dilator is sometimes responsible for the development of pancreatitis.

HEMIGASTRECTOMY AND VAGOTOMY IN THE TREATMENT OF DUODENAL ULCER. R. H. Smithwick *et alii*, *Amer. J. Surg.*, 1961, 101: 325-335 (March).

THE authors have made a study of the results of a series of 346 conservative gastrectomies combined with vagotomy in the treatment of duodenal ulcer. The results were found to be superior to those of sub-total gastrectomy from every viewpoint and they now use this operation as the procedure of choice in the treatment of duodenal ulcer. The operation preserves a larger gastric remnant than the standard sub-total gastrectomy; it thus minimizes the frequency of untoward secondary side effects related to the small gastric remnant and at the same time achieves a maximum incidence of achlorhydria. In the authors' experience more conservative procedures such as vagotomy and gastro-enterostomy are unjustifiable as routine operations because the post-operative incidence of achlorhydria is only 25%. However, they admit that there is definitely a place for these operations when removal of the antrum is impossible or too hazardous because of the morbidity and mortality related to closure of the duodenal stump.

MODIFIED NECK DISSECTION FOR THYROID CARCINOMA. M. A. Block and J. M. Miller, *Amer. J. Surg.*, 1961, 101: 349-354 (March).

A STUDY has been made of 143 patients who have been operated upon at the Henry Ford Hospital from 1924 to 1959 with the hope of cure of carcinoma of the thyroid. It was found that in those patients with palpable cervical lymph nodes, metastases were actually present in 94%. In about one-third of patients in whom the cervical glands were not palpable metastases to the nodes were actually present. A radical neck dissection is indicated in those with palpable lymph nodes providing always that the primary lesion can be removed. Whether or not cervical node dissections should be used for the patients without palpable nodes is not decisively established. However, a modified neck dissection is considered justified in the surgical treatment of many of this group of patients and better results are suggested if it is done. A modified neck dissection has been defined as a dissection which is identical to the classical radical neck dissection except for the preservation of the sternomastoid muscle and the submaxillary gland area. This includes removal of the nodes adjacent to the thyroid and presupposes complete removal of the primary lesion.

EFFECT OF INDUCED ARTERIOVENOUS FISTULA ON LEG LENGTH: 10-YEAR OBSERVATIONS. J. M. Janes and W. K. Jennings, jun., *Proc. Mayo Clin.*, January, 1961.

EXPERIMENTAL WORK begun by the authors in 1947, which indicated that the leg length of puppies could be increased by induced arterio-venous fistulæ, led to the trial of the method in 53 children between the ages of four and 14 years. All children had shortening of both tibia and femur in one leg, as a result of poliomyelitis (39 cases), congenital shortening (10 cases), radium effects (one case), birth fracture (two cases) or trauma (one case). The fistulæ were induced at mid-thigh level between the femoral artery and vein, and 14 have subsequently been closed, either by quadruple ligation and excision or by transvenous repair of the artery with sacrifice of the vein. The main fear—that of cardiac embarrassment—seems to have been unfounded, for although all the patients developed some cardiac enlargement and many developed a wide pulse pressure, a widely-split second sound and a systolic murmur, no cardiac symptoms were experienced and the heart size returned to normal after closure of the fistula. The authors are unwilling to be dogmatic about the value of the procedure, since although in 72% of the 42 children whose fistulæ had been open long enough for a reasonable evaluation the discrepancy in leg length was decreased or remained the same, in 28% the discrepancy was increased. The maximum "catch-up" was 4 cm. over a four-year period. They conclude that the optimum age for the operation is between eight and ten years and that the fistula should remain open for four to six years.

APNEA AND RESPIRATORY INSUFFICIENCY AFTER INTRAPERITONEAL ADMINISTRATION OF KANAMYCIN. R. D. Mullett and A. S. Keats, *Surgery*, 1961, 49: 530-533 (April).

KANAMYCIN was found by the authors to produce respiratory arrest when administered intraperitoneally, identical to that reported to follow the intraperitoneal administration of neomycin. They report a case in which kanamycin, so administered, produced respiratory arrest in a newborn infant under ether anæsthesia; this lasted for some four and a half hours post-operatively. It was dramatically reversed by calcium gluconate. The authors found that a further operation four days later, when kanamycin was omitted, was not followed by respiratory insufficiency.

THE VASCULAR ANATOMY OF SACROCOCCYGEAL TERATOMAS: ITS SIGNIFICANCE IN SURGICAL MANAGEMENT. B. Smith *et alii*, *Surgery*, 1961, 49: 534-539 (April).

THE authors state that the reported deaths after the removal of sacrococcygeal teratomas have been largely due to hæmorrhage and recurrent malignancy. They consider that anatomical studies suggest that excessive blood loss and contamination of the blood stream by cancer cells can be avoided by ligation of the middle sacral artery and vein, prior to mobilization and removal of the tumours.

RESPIRATORY EMERGENCIES IN THE NEWBORN. D. R. Murphy and H. F. Owen, *Amer. J. Surg.*, 1961, 101: 581-587 (May).

A LARGE NUMBER of fatalities among the newborn are due to respiratory failure. A proportion of these are due to intrathoracic conditions which can be successfully corrected if diagnosed promptly. Early recognition and early treatment are essential. All show degrees of dyspnœa, tachypnœa and often cyanosis. A very high salvage rate should be expected to follow surgical repair of a congenital diaphragmatic hernia; the most frequent and fatal type of hernia is due to failure of obliteration of the pleuro-peritoneal foramen of Bochdalek; death may occur within two or three hours of birth if unrecognized, and delay should not be countenanced in making the surgical repair. Another important condition is œsophageal atresia; this can be diagnosed without difficulty with a catheter; the general treatment is discussed by the authors. Pneumothorax, congenital pulmonary emphysema and cystic disease of the lung are described collectively because the symptoms and signs are very alike.

PRIMARY ALDOSTERONISM. F. A. Rogers, *Arch. Surg.*, 1961, 82: 65-77 (May).

THE author reports two patients with primary aldosteronism due to benign aldosteronomas. One of the patients was a girl aged 16 years; it is suggested that she may be the first juvenile to be found with primary aldosteronism due to tumour. The author states that primary aldosteronism must be differentiated from advanced renal disease, which may also occur with hypertension and low serum potassium. He points out that patients with primary aldosteronism can be improved by the administration of potassium by mouth and adrenal corticotrophic hormone. He considers that the operation is best performed with an upper abdominal incision through which both adrenal glands can be adequately surveyed. Removal of a cortical aldosterone-secreting adenoma ends the condition of aldosteronism. If no adenoma is found, the author recommends total removal of one adrenal gland and a two-thirds resection of the contralateral gland. He states that this procedure will produce a clinical remission and the patient will probably not require steroid replacement.

Special Article.

EMERGENCY CARDIO-RESPIRATORY RESUSCITATION OUTSIDE THE HOSPITAL.

By JOHN READ, M.D. (Syd.), M.R.A.C.P.,
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SUDDEN CESSATION of cardiac and/or respiratory function has long been recognized as an uncommon complication of even trivial procedures in the operating theatres, wards and diagnostic departments of hospitals. Extension of the scope of surgery led to an increase in the incidence of operative cardio-respiratory arrest. With this increase came a more aggressive surgical approach to cardiac resuscitation — that of thoracotomy and manual cardiac massage, which has become standard throughout the world. One might reasonably expect the modern surgeon (whatever his special field of interest) to be prepared to perform thoracotomy and manual cardiac massage in the event of circulatory arrest occurring in the operating theatre, while his anæsthetist colleague maintains ventilation of the lungs in the appropriate fashion. Similarly, large hospitals have (or should have) prepared programmes for the emergency management of cardio-respiratory arrest occurring in their wards and diagnostic departments.

Outside the operating theatre or the large hospital the position is not nearly so well or easily defined. Cardiac and/or respiratory arrest may occur as a result of accident or disease in many situations and it is desirable that doctors should be aware of the indications for, and the limitations of, emergency methods currently available for their management.

Circulatory and Respiratory Arrest.

Circulatory arrest means the sudden or rapid cessation of the entire blood circulation as a result of failure of cardiac action. In practical terms this may be due to either ventricular standstill (asystole) or ventricular fibrillation. Oxygenated blood is no longer supplied to the tissues which, having abstracted the oxygen from blood in the local capillaries, become profoundly hypoxic. Changes, at first potentially reversible and subsequently irreversible, occur throughout the body at different rates. Of the specialized body tissues the most important and vulnerable in this regard is the brain, in which irreversible changes are believed to occur after complete arrest of the circulation for four minutes. Irreversible changes occur in the heart, the liver and the kidneys after longer intervals, the exact duration of which is the source of some argument. Such argument would seem largely of academic interest, since the clinical situation is dominated and limited by the occurrence of irreversible cerebral damage. It is obvious that these changes will inevitably follow circulatory arrest, even in the presence of adequate natural or artificial respiration.

By respiratory arrest is meant the sudden or rapid cessation of the respiratory processes. In the present context this always means arrest of, or gross interference with, ventilation of the lungs. Oxygen is no longer adequately supplied to, nor carbon dioxide removed from, the alveoli, and these gaseous changes are reflected in the blood passing through the pulmonary capillaries. As a result the arterial blood and the tissues develop increasing degrees of hypoxia and hypercapnia, with eventual results which parallel those of circulatory arrest. Whilst time is still an urgent factor, it may be seen on theoretical grounds that the body will tolerate respiratory arrest alone for rather longer than it will primary circulatory arrest. There is within the lungs and circulation a litre or so of oxygen at any moment, and this will suffice, if circulation continues, to provide oxygen for several minutes before conditions are equivalent to those pertaining at the beginning of circulatory arrest.

The Medical Section of the International Convention on Life Saving Techniques met in Sydney last year and made the following recommendations for all persons undertaking resuscitation:

1. The most efficient type of artificial ventilation of the lungs is intermittent positive pressure breathing. Manual artificial respiration is less effective.

2. Expired-air respiration is recommended as the best universally applicable field type of artificial respiration.

3. The best methods of expired-air respiration provide an adequate airway, are free from air leaks, and provide adequate inflation pressures.

4. The most important single factor in providing airway patency is maximal backward tilting of the head. In some persons, in addition to backward tilting of the head, forward displacement of the mandible and/or separation of the lips may be necessary.

5. The recommended methods of expired-air respiration are mouth-to-mouth and mouth-to-nose, according to the circumstances.

6. Accessory apparatus and appliances, such as masks and artificial airways, are of some value in certain circumstances as adjuncts to expired-air respiration, but no recommendations are made regarding their use.

7. The Sylvester-Brosch and the Neilsen are recommended methods of manual artificial respiration. The Sylvester-Brosch method provides better lung ventilation, but the Neilsen method may be the preferable method in some circumstances.

8. One hundred *per centum* oxygen given through a suitable machine provides better resuscitation than expired-air respiration or manual artificial respiration; but this should only be given by fully-trained professional rescue personnel.

The accompanying article by Dr. John Read on cardio-respiratory resuscitation extends these recommendations into a first-class set of instructions for the practising doctor. The article is timely and should be read by all doctors, who should give careful thought to the details of the methods recommended. I believe the ability to provide closed-chest manual systole and exhaled-air resuscitation is as important as any other item in the doctor's therapeutic armamentarium.

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International Convention on
Life Saving Techniques 1960.
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In the simple physiological situations outlined the occurrence of complete arrest of the circulation or respiration is assumed. In clinical practice, degrees of arrest short of the complete are met with. The above comments apply with equal force and only slightly less urgency in such situations.

The Clinical Occurrence of Circulatory and Respiratory Arrest.

As clinical syndromes, circulatory and respiratory arrest are closely associated. Primary circulatory arrest rapidly

leads to respiratory arrest as a result of hypoxia in medullary centres. Primary respiratory arrest, especially when incomplete, is compatible with continued cardiac action and blood circulation for a short time. Though circulatory or respiratory phenomena may classically predominate in certain clinical situations, each patient should be individually assessed with regard to the adequacy of respiration and circulation. For this reason no clear-cut distinctions between the two types of arrest are drawn in the ætiological discussion which follows.

In every person who dies, circulatory and respiratory arrest occur, sometimes as the primary cause of death, and sometimes as a result of disease in other organs. Indeed, use of the resuscitative measures to be described might be held to represent an attack upon the clinical state of death. The classification suggested here is incomplete, but gives an indication of some of the clinical situations in which cardio-respiratory arrest may be of potential therapeutic importance to a medical practitioner on the spot.

(*a*) Accidents and Violence:
Drowning or suffocation.
Electrocution.
Poisoning by gases or drugs.

(*b*) "Doctor-induced" Situations:
Drug or serum sensitivity.
Unexplained collapse during minor procedures.

(*c*) Medical Conditions:
Myocardial infarction.
? Pulmonary embolism.

Methods of Emergency Resuscitation.

The various emergency methods for countering circulatory or respiratory arrest depend upon the artificial maintenance of the blood circulation and pulmonary ventilation till such time as (*a*) natural ventilatory and circulatory functions return, or (*b*) the patient can be moved to a hospital for more definitive resuscitation.

Artificial Ventilation.

A mass of data from all parts of the world has confirmed the definite superiority of the various methods of exhaled-air resuscitation over the older manual methods. One or more of the accepted techniques (mouth-to-mouth, mouth-to-nose or mouth-to-airway) should be well known to all medical practitioners. Mouth-to-mouth or mouth-to-nose resuscitation can be safely applied in almost all circumstances in the absence of specialized equipment. The International Convention on Life Saving Techniques held in Sydney in March, 1960, did not recommend the use of special artificial airways by untrained personnel. On the other hand, the availability of such an airway in a doctor's bag may make artificial ventilation easier and more efficient in his hands; and once placed in position by the doctor it may render artificial ventilation by the untrained relative or bystander far more efficient.

The most important general points to be remembered in making exhaled-air resuscitation in any form efficient and safe are: (*a*) the upper airways must be kept patent by hyperextension of the neck—lifting forward of the mandible is secondary in importance to this manœuvre; (*b*) excessive force during inflation should be avoided, especially in infants and children. Observation of the excursions of the chest cage and upper abdomen forms the best basis for assessing the efficiency of ventilation.

Exhaled-air resuscitation may be used in almost all circumstances when respiratory arrest is present. Arrest due to poisonous gases forms about the only source of worry to the operator. In such situations the operator should ensure that his only contact with the patient's respiratory tract is during inflation of the patient's lungs. His own inspirations should be taken from a point well clear of the patient's mouth and nose. So long as resuscitation is being performed away from the originally polluted site, the hazards to the operator should be minimal; but one should be aware of them and avoid foolhardy risks. The unknown hazard of infection from the patient's respiratory tract is one which the resuscitator must accept, and if necessary, take measures against afterwards.

Artificial Circulation.

An artificial circulation may be provided in one of two ways. In terms of emergency procedures it matters not whether the circulatory arrest is due to ventricular asystole or ventricular fibrillation.

Thoracotomy and Repeated Manual Compression of the Ventricles.—Thoracotomy and repeated manual compression of the ventricles is the standard procedure under operating theatre conditions, and until recently provided the only efficient method of artificially maintaining the circulation. Since it involves creating an open pneumothorax, some form of positive-pressure artificial ventilation must be provided. The permanent recovery rate obviously varies with the group of patients studied, but Stephenson (1958) records a rate of 29% in his cardiac arrest registry. In good-risk patients promptly treated the survival rate may be a good deal higher. When thoracotomy and manual cardiac massage are performed away from the highly organized facilities of the operating theatre the results are not nearly so impressive. Stahlgren and Angelchik (1960) collected data on patients in whom this procedure had been performed in the wards and diagnostic departments of the Philadelphia General Hospital during the period 1954-1959. Only one out of 25 such patients recovered completely and left hospital. It would be optimistic to expect the results of open thoracotomy and direct manual cardiac massage to be better than this when performed outside the confines of a hospital (the so-called "penknife cardiac massage").

Closed-Chest Manual Systole.—Closed-chest manual systole was described in 1960 by Kouwenhoven and his colleagues from the Johns Hopkins Hospital. It was extensively tested in dogs with induced ventricular fibrillation; in these animals it was found possible to maintain systolic blood pressures in the femoral artery of 100 mm. of mercury by repeated manual compression of the anterior chest wall towards the vertebral column. The same paper reports the use of this technique in 20 patients, with successful resuscitation in all, and with 14 full and permanent recoveries. Repeated manual compression of the chest was required for periods of one to 65 minutes. The patient should be lying on his back on a firm surface to support the spine. The heel of one hand is placed on the lower part of the body of the sternum just above the xiphoid, with the other hand on top of the first. Pressure is applied to the body of the sternum about 60 times per minute, of such a degree as to drive the sternum 3 or 4 cm. towards the vertebral column. The anterior chest wall is allowed to expand fully between each stroke. The chest of an unconscious patient has been found to be more flexible than one might expect, but in adults the resuscitator should use part of his body weight in applying the manual pressure. In small children finger pressure alone may be sufficient to produce the necessary degree of sternal depression. During compression, the heart is squeezed between the sternum and the vertebral column and the unidirectional cardiac valves determine that blood flow shall occur into the aorta and the pulmonary arteries. During relaxation of pressure the cardiac chambers are refilled from the venous side of the circulation. Since no open pneumothorax is produced, positive-pressure ventilation is not needed for the procedure as such. However, since patients with circulatory arrest almost invariably have respiratory arrest as well, positive-pressure ventilation by one of the expired-air resuscitation methods will almost certainly be needed. It is difficult for a single operator to perform both closed-chest manual systole and expired-air resuscitation for more than a brief period of time. Indeed, Kouwenhoven and his colleagues suggest that their technique provides some ventilation of the lungs and that, if only one person is present, he should concentrate on the closed-chest manual systole. When circulatory arrest is due to ventricular asystole, successful resuscitation is signalled by the return of spontaneous cardiac contraction. When the underlying disturbance is ventricular fibrillation, spontaneous return of sinus

rhythm is uncommon, and definitive electrical defibrillation is likely to be required in hospital. The object of either of the two methods described is simply to maintain blood circulation to the tissues until normal cardiac action is spontaneously or electrically restored, or until it is apparent that permanent clinical death has occurred. Closed-chest manual systole is a new procedure, and obviously a complete and definitive assessment of its ultimate value must await further field testing. However, the preliminary data suggest that it will be at least as effective as thoracotomy with direct cardiac massage when used outside the operating theatre. It is recommended that closed-chest manual systole should be the resuscitative method of choice for circulatory arrest occurring outside hospital, unless the resuscitator has some special training, experience or data that make him feel obliged to perform thoracotomy.

Assessment of the Patient.

The physiological sequelæ of cardio-respiratory arrest, the clinical situations in which such arrest may arise and the individual methods available for resuscitation have been considered. It remains to discuss briefly the problem of when to act or refrain from acting, before an attempt is made to draw up a formal programme for attempted resuscitation outside the hospital.

It is suggested that answers to the following three questions may help to define the doctor's attitudes and activities when he is faced with the problem of emergency resuscitation. At the same time every individual physician must make his own decisions on his own responsibility in the particular circumstances of the situation.

He should first ask himself: "Is circulatory arrest present?" Many diagnostic finesses have been described in this assessment. The overwhelming objection to most of them is that they waste valuable time in performance. It is suggested that circulatory arrest may be regarded as present if: (*a*) no pulse is palpable in a large vessel (the femoral or carotid artery); (*b*) no heart sounds can be heard.

Secondly, he should ask: "Is respiratory arrest (complete or partial) present?" This must be answered by a rapid clinical decision. A significant degree of respiratory arrest may be regarded as being present if: (*a*) breathing movements are absent or only occasional; (*b*) respiration is shallow, infrequent or laboured, and cyanosis is present; (*c*) circulatory arrest has occurred. In case of doubt, the guiding rule is to assume the worst.

The third question which the doctor should ask himself is: "Do any major contraindications to attempted resuscitation exist?" These may be considered under the headings of (*a*) efflux of time, and (*b*) the cause of the arrest. With regard to the efflux of time, if one can be sure that complete arrest of the circulation has been present for more than four minutes, irreversible cerebral damage is almost certain to prevent complete recovery even if cardio-respiratory function can be temporarily restored. In many circumstances outside hospital it will be impossible to pin-point the onset of circulatory arrest with any precision. In case of doubt, it is probably wise to err on the side of giving the patient the benefit of attempted resuscitation, especially in the younger, previously healthy individuals. The second consideration, that of the cause of the arrest, also merits attention. In over-enthusiastic hands attempted resuscitation outside the operating theatre has often been used partially to restore life to the inevitably dying. The patient with grave general disease or severe chronic cardiac or respiratory failure, or the patient of advanced years is far less likely to be successfully resuscitated than others; and indeed it might reasonably be suggested that attempted resuscitation in such cases is purely meddlesome. The individual physician must decide (quickly) where to draw the line between action and inaction; and in this respect the phrase "*primum non nocere*" forms a useful guide. Drowning, poisoning, electrocution and untoward reactions to medical procedures form fairly clear-cut indications for action as such. At the same time, sudden cardio-respiratory arrest as a result of myocardial infarction or other medical emergency in a previously healthy person should be seriously considered as a potential indication for vigorous resuscitation.

Programme for Resuscitation.

Assessment.

Answers are rapidly sought to the three questions: (*a*) "Is circulatory arrest present?" (*b*) "Is respiratory arrest present?" (*c*) "Are there any contraindications to attempted resuscitation?" One should be able to complete this assessment along the lines of the previous section within 30 seconds or so. Any hesitation should be in deciding whether to do something, not in deciding what to do. In the programme that follows, the chances of positive harm being done by unnecessary resuscitatitive measures are more than outweighed by the risks of unnecessary delay in their institution.

Resuscitation.

If respiratory arrest (complete or partial) is present alone, then exhaled-air resuscitation should be instituted by one of the standard techniques. If combined circulatory and respiratory arrest is present, then, with the patient lying on his back on a hard surface, closed-chest manual systole plus exhaled-air resuscitation should be instituted. If a competent assistant is at hand he should carry out the exhaled-air resuscitation while the doctor performs closed-chest manual systole. If the only potential assistant is untrained in first-aid measures, his first efforts at exhaled-air resuscitation will be aided if the doctor has available and can quickly insert one of the special oro-pharyngeal resuscitation airways. The physician can then perform closed-chest manual systole while supervising the exhaled-air resuscitation. If faced with a case of cardio-respiratory arrest when no helper is available, the doctor will probably be forced to accept the suggestion of Kouwenhoven *et alii* that he should concentrate on the closed-chest manual systole and hope that it will incidentally produce some pulmonary ventilation. (Alternatively, if a resuscitation airway is available and will stay in position without obstructing breathing, he may be able to give occasional inflations of the lungs.) The immediate adequacy of the resuscitative procedures is indicated by: (*a*) improvement in the patient's colour and constriction of previously dilated pupils; (*b*) adequate chest movement occurring with each inflation and a palpable large-vessel pulse with each manual systole.

Only after these adequate resuscitative measures are in progress can thought be given to other procedures, such as the following. If a third party is available, he should be instructed to call an ambulance to convey the patient to hospital for definitive assessment and resuscitation. If it is available, he may draw up 0·2 ml. of 1:1000 adrenaline solution to be given by intracardiac injection. The value of this is debated, and certainly one should not delay the institution of resuscitation in order to prepare and give the injection. The third party should elevate the patient's legs. This alone has been reported as restarting an arrested heart (Woodward, 1960). In addition it may divert some of the small cardiac output away from the legs to the brain and other important viscera.

What Then?

The most gratifying and successful result of these resuscitative measures is the return of spontaneous cardiac contraction and/or ventilation. When either or both do return satisfactorily, the appropriate assistance should be stopped, and the patient should be carefully observed lest further arrest occur. In most cases observation will best be carried out in hospital. On the other hand, resuscitation may have to be continued until transport is available to take the patient to hospital. The measures outlined should be continued in the ambulance. Once he is in hospital a more definitive assessment of the situation may be made and more sophisticated resuscitative measures may be instituted.

The determination of how long one should persist in resuscitatory efforts in the absence of the return of spontaneous cardiac contraction and/or ventilation, or of ambulance transport, can be an extremely difficult problem, and will require assessment in the light of local circumstances. Certainly if no further signs of clinical death develop, if the pupils remain small and the colour good, and the patient is of a reasonable age and was previously healthy, resuscitative measures should be pushed to the limit of the resuscitator's endurance. In the face of any improvement in the patient's clinical state, resuscitation should be continued. On the other hand, it must be accepted: (*a*) that the longer one has to persist with assisted circulation and ventilation, the less the ultimate chance of recovery; (*b*) if the underlying cause of the circulatory arrest is ventricular fibrillation, the chances of reversion to normal cardiac contraction are small without electrical defibrillation.

General Comments.

When cardio-respiratory arrest is due to civil or medical accident, the indications for appropriate resuscitative measures are usually cogent. In most of those patients in whom cardio-respiratory arrest is due to disease the most reasonable medical, moral and humane approach is for the physician not to be meddlesome. But it is suggested that from time to time proper opportunities for emergency resuscitation do present themselves outside hospital in the group of younger, previously healthy people with acute medical conditions which are potentially remediable if the patient can be tided over the period of arrest.

In general, one will not expect a large yield of complete and permanent recoveries from resuscitative measures such as have been outlined. The success rate will be highest when respiratory arrest alone is present, in the young adult age group and in those previously healthy. The "accident" group will, in general, do better than the "medical conditions" group. But any failures occurring after efficient and vigorous resuscitation must be viewed in perspective. These are salvage procedures performed, when the indications are sound, on patients for whom the inevitable alternative is death. Any significant survival rate without sequelæ is pure gain; and the more efficient the resuscitation the higher this rate will be. Every doctor should know how to maintain the ventilation and circulation artificially. Any hesitation in the application of this knowledge should be due to a consideration of whether to do anything, not to a consideration of what to do.

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Out of the Past.

HEALTH IN THE METROPOLIS (SYDNEY).[1]

(Report of the Medical Officer of Health for the month of July, 1903.)

[From the *Australian Medical Gazette*, August 20, 1903.]

THE number of deaths, after distributing hospital deaths to their proper districts, was 495, equal to a death rate of 11·66 per 1000 living. The number of deaths is 22 greater than the monthly average number for the portion of the year which has expired. The increase for the month is accounted for under the headings of cancer, which caused 35 deaths, against a monthly average of 29; prematurity, 25 deaths, against a monthly average of 15; and Bright's disease, 36 deaths, against a monthly average of 25. Other causes of death showed little or no deviation from their monthly average. One death was registered from epidemic cerebro-spinal fever. Deaths from the notifiable infectious diseases numbered 16, of which four were due to scarlet fever, six to diphtheria, and six to typhoid fever. There has been a considerable decline in the number of attacks notified from all these diseases during July. Especially is this the case with scarlet fever, the notified number of attacks from which fell from 355 in June to 241 in July, a decrease which warrants the hope that the height of the epidemic of this disorder, which has been prevalent in Sydney for the past 12 months, has now passed. Typhoid fever, with 53 notified attacks, has been more prevalent than is usual during July, the average number of attacks from typhoid fever during the corresponding month in the previous five years having been 34. Infantile deaths in July numbered 97, which is well below the monthly average.

[1] From the original in the Mitchell Library, Sydney.

Correspondence.

DEFECTS OF THE ATRIAL SEPTUM.

SIR: I have read with interest Mr. George Westlake's paper on "Defects of the Atrial Septum" (MED. J. AUST., October 21). He is to be congratulated on the surgical achievements of his unit and on the clarity with which they are presented. However, certain of his statements on the development of the heart do not accord with observation and cannot be allowed to pass unchallenged, even in an "extremely over-simplified brief account".

There is no stage of normal human development comparable to that represented by Mr. Westlake's Figure I, which implies that there is admixture of the pulmonary and cardinal venous returns in the sinus venosus. Normally an evagination from the sinus venosus[1,2] grows into the dorsal mesocardium, later to meet the pulmonary venous plexus and form the common pulmonary vein. However, before the pulmonary venous plexus is tapped, an elevation to the right of the evagination contributes to the interatrial septum primum,[3] and the sinu-atrial septum grows across caudal to it[4] so that the ostium of the common pulmonary vein is relegated to the left atrium. Pulmonary venous return is thus, from the beginning, to the left atrium.

I am sure that Mr. Westlake did not mean to say that ". . . the only remnant of the sinus venosus in the adult heart is found in a region of the left atrium between the pulmonary veins", for this statement excludes the sinus venarum of the right atrium and the proximal part of the coronary sinus, which are accepted sinus derivatives. Furthermore, connexion between the common pulmonary vein and the pulmonary venous plexus is achieved without branching of the former, so that its primary and secondary tributaries may be considered derivatives of the pulmonary venous plexus as in the chick.[5] After the common pulmonary vein and these tributaries have dilated and opened out to form the vestibule of the left atrium, the region around, and not between, the pulmonary veins is derived from the sinus venosus.

The whole question of the value and validity of embryological introductions to clinical papers should be considered. All too often such accounts either are sterile recapitulations or take liberties with the observed facts. Of no field is this more true than of congenital heart disease. No less a cardiac pathologist than Maude Abbott[6] once "invented" a stage in human development, in which an aorta arose from the right ventricle, in order to explain transposition on Spitzer's

[1] Adler, J. (1948), *Anat. Rec.*, 101 : 581.

[2] Neill, C. A. (1956), *Pediatrics*, 18 : 880.

[3] Davies, F., and MacConaill, M. A. (1937), *J. Anat.* (*Lond.*), 71 : 437.

[4] Odgers, P. N. B. (1935), *J. Anat.* (*Lond.*), 69 : 412.

[5] Buell, C. E., Jr. (1922), *Contr. Embryol. Carneg. Instn.*, 14, No. 277 : 13.

[6] Abbott, M. E. (1936), "Atlas of Congenital Cardiac Disease", American Heart Association, New York.

theory. Advances in our understanding of congenital anomalies cannot be made with such precepts.

Yours, etc.,

School of Anatomy, C. P. WENDELL-SMITH.
University of New South Wales.
Kensington.
October 25, 1961.

CAUSATION OF CANCER.

SIR: Primary neoplastic disease occurs in all bodily tissues, with the exception of the heart and possibly the spleen.

Is there any explanation for this?

And would this observation be of any significance in evaluating the causation of cancer?

Yours, etc.,

55 Lindfield Avenue, A. L. DUCKER.
Lindfield,
New South Wales.
October 30, 1961.

SALARY OF A VIROLOGIST.

SIR: A recent advertisement from Prince Henry's Hospital, N.S.W., for a "virologist to establish a diagnostic laboratory and to teach clinical microbiology" comes as a shock from the salary point of view. There are two markedly different salary ranges, viz., £3204-£4164 for medical graduates and £2311-£2787 for science graduates: a differential ranging from £893 initially to £1377 at the upper level. Without discussing whether either is adequate, may I ask why there is this favoured treatment of medical graduates?

Whilst this treatment perpetuates and even exaggerates an anachronism in our newest medical school, it is to be noted that Cambridge, England, last year levelled the salaries of medical and non-medical staff holding similar appointments. From another point of view, it might be stated that minor differences have been tolerated in the past in the fields of biochemistry and bacteriology, but surely there is no need for these in virology, the most rapidly expanding discipline in microbiology!

Yours, etc.,

33 Balfour Avenue, IAN JACK.
Heathmont,
Victoria.
October 27, 1961.

OBSTETRIC PATIENTS: CONTINUITY OF SUPERVISION.

SIR: May I, through your columns, make an appeal to all of our profession who practise obstetrics, either as specialists or general practitioners, to ensure continuity of supervision of their patients. One often sees a patient, who has been attended and is to be confined by a doctor in another town or city, who comes stating that she has been told to report to her local doctor for supervision, but has been given no covering letter. One has no idea, when one sees her, what was her previous weight or blood pressure, or if there is any abnormality in her history or physical condition, or what is her blood group, any of which may be important should an emergency occur. The question of professional courtesy may be a minor matter, but the welfare of the patient is not.

When consulted by a pregnant woman who is travelling, as one often is in a country centre, it is surely our duty to take a full history and make an examination and group her blood, just as if she were a patient who would be continuing under our supervision. This card should then be entrusted to the patient, so that she can present it to each doctor to whom she reports for ante-natal supervision, and he may enter the relevant information. I find it wise, also, to give each pregnant woman a printed card of instructions, on which I enter her blood group and the approximate times at which she should report for supervision.

These, I think, are duties which we owe to our patient, whether she will be confined by ourselves or someone else, and I would like to appeal to all to cooperate in their discharge.

Yours, etc.,

26A Castlereagh Street, K. H. BROOME.
Coonamble,
New South Wales.
November 2, 1961.

SHORTAGE OF DOCTORS.

SIR: Certain important events affecting medical practice in Australia are not widely known.

Of the doctors registered to practise in New South Wales last year, 45% were imported and only 55% graduated from our medical school. The situation is similar in Victoria. The imported doctors were mainly from Britain and the other Australian States.

A correspondent in the *Manchester Guardian Weekly* (October 26, 1961) points out: (i) that despite a population increase in Britain of 10%, the number of medical students has declined to the 1938 level; (ii) that in the last decade the average annual emigration of doctors was 600, representing one-third of the total British graduates; (iii) to make up the deficit in Britain, about 1000 doctors were imported mainly from under-developed countries (especially India and Pakistan). In the Sheffield area the junior resident staff were entirely imported in 26 of the 74 area hospitals.

The editor of the *Manchester Guardian Weekly* asks two questions: "How does it come about that the output of the medical schools in Canada and Australia falls so short of these countries' needs that they can each absorb 200 or so British doctors every year? . . . Or is this exodus of such long standing that they have learned to rely on it?" These questions gain new emphasis when public attention is directed to the shortage of doctors and a review of the policy of the British Government on immigration is projected.

It would be informative if in your columns those who defend the present system of medical education in Australia could give their answers. There will be those who, like myself, believe that only reforms of a fundamental nature can cope with the dilemma. It is surely not unreasonable to propose that sufficient doctors should be graduated from our medical schools to provide for the needs of the Australian community. Further, a disquieting impression that much more could be done with our existing resources ought to be allayed.

Yours, etc.,

149 Macquarie Street, KENNETH W. STARR.
Sydney.
November 2, 1961.

Public Health.

POLIOMYELITIS VACCINE PRODUCTION.

THE following statement on poliomyelitis vaccine and its production has been prepared and made available by the Federal Minister for Health, Dr. D. A. Cameron.

Only in the past 15 years or so has any real progress been made in the attack on the disease of paralytic poliomyelitis. Most of the early active work on poliomyelitis was done in the United States where an awakened public donated funds for sustained research after the setting up in 1938 of the National Foundation of Infantile Paralysis. Research had to be developed in many fields, scientific information about the disease and its incidence had to be exchanged widely, and community projects developed as a basis for a concerted attack.

Dr. Jonas E. Salk, working in the University of Pittsburgh, followed up a discovery made earlier that poliomyelitis virus may be present in the blood of human beings prior to the onset of the illness, and that polio-fighting antibodies could confer protection against the disease. He worked on the inactivation of the virus to render it capable of stimulating the human body to produce such antibodies in perfect safety. The result of the application of this concept was the Salk vaccine. It has now been administered to many

millions of children in many countries of the world, and the results have proved its effectiveness and safety.

Australia was fortunate to be able to adopt a vaccine which had already been proved on such a massive scale to possess safety and effectiveness in building immunity against poliomyelitis. When, in 1955, it became clear that the United States had developed a vaccine that was both effective and safe, it also became apparent that demand for the vaccine in that country would be so great as to preclude the possibility of supplies being exported in any quantity, to Australia or elsewhere. The Government therefore instituted immediate steps to prepare for large-scale production at the Commonwealth Serum Laboratories. An expenditure of some £200,000 was authorized, to provide the requisite plant and buildings at the Laboratories. It was a particularly fortunate circumstance for Australia that for some time previously Dr. P. L. Bazeley had been working in the United States with Dr. Salk, at the University of Pittsburgh, and was in a position to bring back with him to Australia the necessary experience and technical knowledge to enable him and other experienced virologists at the Laboratories to establish production. The then Director of the Laboratories, Dr. F. G. Morgan, as well as Sir Macfarlane Burnet, counselled the Government to go ahead with this project as rapidly as the necessary arrangements could be made. It is to this day a matter for the greatest satisfaction that the Government had no hesitation in accepting that forthright advice. Without any doubt, hundreds of Australian lives had been saved in consequence, and thousands, perhaps, of cases of poliomyelitis have been avoided.

The vaccine is produced at the Commonwealth Serum Laboratories in tissue culture according to the method used by Salk. It is necessary to cultivate viruses in living tissue. In the case of poliovirus, kidney tissue taken from monkeys is used for this purpose. After the addition of nutrient fluid and incubation at body temperature, the cells multiply and produce a large crop of suitable tissue. This process takes eight days. Virus is added to these fully-grown tissue cultures, and after two or three days' incubation the cells are completely broken up by the action of the virus. Large quantities of the virus are now freely available in the fluid for harvesting. The fluid is filtered several times to remove all debris and cell particles. The virus passes through the filters with the fluid. The fluid is then inactivated with formalin. It is incubated at body temperature for at least ten days after the formalin is added. At the end of the fourth day of the process inactivation of the virus is complete, but the exposure to formalin is allowed to continue several more days to ensure absolute safety in the final vaccine. Tests are made in tissue culture at seven days and again at ten days. Both are required to be negative for virus.

When these exhaustive tests are complete, the vaccines of the three types of poliomyelitis virus are mixed, which process forms the final trivalent vaccine. Still further tests are made, both in tissue culture, and by intracerebral, intraspinal and intramuscular injections given to monkeys. In addition to the safety tests, potency tests are also carried out both in tissue culture and in monkeys, so that the vaccine's effectiveness can be gauged simultaneously with its safety. The Fairfield Hospital, which acts as an independent testing authority, undertakes final safety tests in addition to those carried out at the Commonwealth Serum Laboratories, using samples of the finished vaccine as prepared for release.

When all tests show the absence of live virus, the vaccine is dispensed into ampoules. A further safety test in tissue culture is done on a number of ampoules, selected at random. The time from commencement to time of issue for each batch of about 600,000 doses is approximately six months. The completion of one batch of 600,000 doses, of course, does not mean that it will be six months before another is ready. Several batches at a time are in more or less constant production, scheduled to follow one upon the other at regular intervals, sufficient to meet Australia's demands.

Many problems are regularly encountered in poliomyelitis vaccine production. Manufacturers of this poliomyelitis and other tissue-culture vaccines are faced with the inherent difficulty of starting with a preparation of living cells derived from an animal that cannot be bred under controlled conditions. The monkey is a carrier of a number of virus diseases known and unknown, and these viruses can sometimes grow in the tissue cultures prepared from monkey kidneys. They may or may not cause destruction of the cells. A monkey can be clinically in good health and yet still carry such viruses. This makes the detection and prior rejection of such monkeys a practical impossibility. These viruses may be present in high but undetectable concentration in the kidneys, but may only appear in the tissue cultures when vaccines are being tested. The presence of such viruses interferes with safety tests by reducing the sensitivity of the tissue to poliomyelitis virus in the control tests and assay procedures by destroying the tissue before poliomyelitis virus has the opportunity to infect it. Tissue cultures have varied in their sensitivity to poliomyelitis virus over the six years. When tissues are relatively insensitive to the virus, it is necessary to repeat a safety test causing further delay in the progress of a batch.

The presence of intercurrent virus infections in monkeys causes difficulty in the intracerebral and intraspinal safety tests. When spinal cords of test monkeys are examined histologically, there is often evidence of a focal myelitis which is not poliomyelitis, but is caused by a viral agent present in normal monkeys. Bacterial infections in monkey kidneys have been one of the lesser problems. When these infections are present, the whole batch of tissue cultures is contaminated and lost to production.

An index of the state of health of monkeys imported from Malaya, India and the Philippines is their survival rate. In 1955 the first shipments had a survival rate of 70% to 90% at 12 weeks after arrival. This figure fell to the region of 30% in the period August, 1957, to July, 1960, with a record low level of 8% survival of one lot of 1752 monkeys from Kuala Lumpur in March, 1960. In the last 12 months the survival rate has climbed back to about 80%. A total of 44,880 monkeys had been imported in 63 lots up to June, 1961.

The major difficulty in maintaining production schedules has been the appearance of live virus in tissue-culture safety tests. There has also recently been one batch where live virus has been detected by intraspinal injection of monkeys. It has not been possible to establish the source of this live virus in all cases, and the intensive research is continuing with the object of elucidating this problem. This is not a new development. Ever since 1956 there have been occasions on which virus was detected in specific batches. This shows how effective are the stringent safety tests imposed by the Department on the vaccine. There have been batches of monovalent vaccine where virus has been detected, and after further inactivation the tests have been satisfactory. Such batches can be used. The more disturbing feature has been the appearance of virus in safety tests on trivalent vaccine when the individual monovalent tests were previously satisfactorily passed. Because of this it was decided that the most expert advice available should be obtained, and this became the subject of investigation by the special committee I appointed last May. This committee, as members will remember, was headed by Sir Macfarlane Burnet.

The special committee, I am happy to say, believes that as far as it is possible to predict such matters, the Commonwealth Serum Laboratories' production difficulties have been overcome. However, from what I have said, it will, I am sure, be appreciated how difficult it is to make such a prediction with any complete degree of certainty.

The Government, of course, makes no apology for submitting this Commonwealth Serum Laboratories poliomyelitis vaccine to the strictest safety and potency tests. It is our aim and intention that the vaccine as released to the public shall be perfectly safe and of uniformly high potency. I do not believe there can be the slightest departure from that principle, no matter how worrying and embarrassing may be the problems that arise from it from time to time.

Let me now examine the effectiveness of this vaccine. During the period it has been in use in this country it has exhibited a conclusive protection rate of more than 90% amongst those who have received the full course of three injections. This rate has been maintained through minor epidemics, irrespective of the type of poliovirus responsible.

From June, 1956, when large-scale vaccination against poliomyelitis was commenced in Australia with the Salk-type killed virus vaccine prepared by the Commonwealth Serum Laboratories, to June, 1961, a total of 587 confirmed cases of poliomyelitis has been notified. Of these, 500 have been in persons not vaccinated at all, 32 in persons who had received one injection, 26 in persons who had been given two injections, and only 29 among persons who had received the full course of three injections. Even the fact that 29 persons who had been fully vaccinated have subsequently contracted poliomyelitis does not establish anything concrete against the over-all efficacy of the vaccine. The response to any vaccine varies with the individual, and the subsequent contraction of poliomyelitis may well be a matter of

unfortunate chance, concerned with the individual's reaction, rather than any indication that the vaccine is not, to all intents and purposes, wholly effective. There is no evidence whatever that anyone should decline to accept vaccination on the ground that the vaccine does not necessarily give complete protection. These figures suggest, in fact, that the vaccine is considerably more effective than the 90% which we have always claimed as the established probability.

Now may I give some details of the number of persons who have been vaccinated? During the early period, when the vaccine was in urgent and heavy demand, priority in vaccination was given to school children, pre-school children, pregnant women and others at special risk. These restrictions were subsequently lifted, and by June of this year 16 million doses of vaccine had been issued from the Commonwealth Serum Laboratories and nearly four million persons in Australia had received the full course of three injections. About 90% of all school children have been fully vaccinated and 70% of pre-school children. In the 15-19 years age group more than 75% have been vaccinated, and about 40% of the 20 to 40 years age group, which includes most of the susceptible adults, have received vaccine. The danger areas where more intense vaccination is urgent are apparent when the incidence of cases is considered. These are particularly in pre-school children, which are the most susceptible group, and the young married persons (or rather the married persons with young children), who are an especially exposed group because of contact with their children, who come in contact with other children at school. It should be borne in mind, in this context, that a child at school, for example, can be a "carrier" of poliomyelitis, without himself having contracted the disease, or manifesting any symptoms of it. He can nevertheless transmit it to other children.

The question that must concern us most of all, of course, is the present incidence of poliomyelitis in Australia, in association with the fact that there are still difficulties concerning supply of the vaccine. Here some past history is useful in assisting us to gain a proper perspective of the current position. Between July, 1949, and June, 1956, Australia experienced the worst poliomyelitis epidemics in its history. During this time 15,776 cases and 938 deaths were reported. Some 60% of the cases occurred in the age group 0-14 years. The Commonwealth Serum Laboratories, as I have mentioned, released their first batch of Salk type vaccine in June, 1956. The concerted campaigns for the mass immunization of the population against poliomyelitis commenced in July, 1956. As the campaign proceeded, the incidence of poliomyelitis fell remarkably. In the calendar year 1938, for example, there had been 2698 cases. In 1945 there had been 1226 cases, and in 1946 there were 1223. In 1950 there were 2206 cases, and in 1951 no less than 4736. The number of cases ranged from 1500 to 2000 in 1952, 1953 and 1954. It fell to 874 in 1955, but was back to 1194 in the calendar year 1956, when the vaccination campaign began. In the following year, 1957, the incidence fell dramatically to 125 cases, in 1958 to 100 and in 1959 to 56. The figure for 1960 was 105. In the financial year 1960-1961, which affords the latest twelve-month figure available to me, the total number of confirmed cases was 176. This, I acknowledge, is in a relative sense a high figure—too high for any of us to accept with any complacency—but that is purely in a relative sense. It in no way compares with the incidence of the disease before the vaccination campaign began, when the number of cases was almost invariably between 1000 and 2000. It will be recalled that in the epidemic year the number of cases was, as I have mentioned, nearly 5000. The fact is that even since the immunization campaign began we have averaged about 100 cases a year. In that respect the total of 176 is in no sense alarming. It is, however, quite sufficient to warrant the utmost vigilance on the part of the Government and the health authorities generally, and it emphasizes the need, by whatever means is available to us, to restore full and in fact surplus supplies of vaccine at the earliest possible moment.

Australia has not, of course, been entirely without Salk vaccine throughout this year. From the batch released by the Commonwealth Serum Laboratories last November almost 200,000 doses of quadruple antigen were produced. This antigen, suitable for infants from six months to two years of age, has a full Salk vaccine component and affords immunity simultaneously against poliomyelitis, diphtheria, whooping cough and tetanus. This material was available until quite recently and was extensively availed of for infants in the appropriate age groups. Supplies have now been exhausted, and it is not proposed to produce more until supplies of Salk vaccine are readily available. This decision was reached on the advice of the National Health and Medical Research Council. Salk vaccination can be accompanied by injections of what is known as triple antigen, to give the same protection as is normally offered by quadruple antigen.

The State Governments were advised immediately doubts arose concerning the availability of further supplies of Salk vaccine from the Commonwealth Serum Laboratories late last year, and they conserved their supplies carefully. In July we were able to make available some 160,000 doses of Salk vaccine imported from Canada, and in the past two months 380,000 doses of vaccine produced by the Commonwealth Serum Laboratories have been distributed. We have every expectation that a batch giving another 600,000 doses will become available in December. However, in case there are further difficulties we are seeking further supplies from overseas, as a precautionary measure. Unfortunately, production and testing difficulties which are apparently very similar to those we have experienced in Australia have created a shortage of vaccine from producers in Canada, Great Britain, the United States and Japan. I refer specifically to supplies of vaccines of similar composition to our own, which we feel should be preferred. At this moment we have not been able to secure a positive date for the delivery of the overseas material, but nothing will be left undone to expedite its arrival. On the other hand—and there seems to be every reason to be hopeful in this respect—if the batch of vaccine now in course of preparation at our own laboratories is ready on schedule, or reasonably close to schedule, the imported vaccine will be a useful reserve, either for future use or to permit the more rapid distribution of even greater quantities of vaccine than is already planned.

World attention has recently been turned to the very successful results that have been achieved in a number of countries with the use of several types of live oral vaccine. This is an attenuated instead of a so-called "killed" vaccine. Its principal advantage, as its name implies, is that it can be administered by mouth, either as a liquid or as a confection, instead of by injection. It has the further ostensible advantage that since the vaccine used is live, it is capable of transmitting its effect, by way of the bowel, from person to person. This is known to have had the result of conferring immunity against poliomyelitis on other persons, usually living in close proximity, who have not actually taken the vaccine themselves. We have for some time been carefully watching progress in development and use of this vaccine. We have considered that the evidence available does not at present justify our discontinuing the use of Salk type immunization in its favour. It is evident, for example, that what is known as the interference phenomenon prevents immunization of the subject by live vaccine in a significant proportion of cases. Also the National Health and Medical Research Council feels that there is still some doubt whether the possibility of reversion to a virulent form might not render the vaccine dangerous in a population such as Australia's, where young adults are in great measure unprotected, and we are not yet satisfied that the risk of contamination by other viruses derived from the tissues in which the vaccine is cultivated has been completely and satisfactorily excluded. In the circumstances we have preferred to await more satisfactory evidence on these three points, especially whilst we are able safely and efficiently to immunize our population with Salk-type vaccine.

Officers of the Commonwealth Health Department, both from Canberra and from the Commonwealth Serum Laboratories, have attended a number of conferences overseas called to consider this question of the use of live oral vaccines. In face of recent information that Britain is now using this vaccine in specific areas to combat widespread outbreaks of poliomyelitis, and the United States is also moving closer towards its general use, it has been decided to send overseas an experienced medical officer from the Commonwealth Serum Laboratories. The purpose will be to enable him to study field and other trials with the vaccine at first hand.

Notes and News.

Parr Rheumatic Prize.

It is announced that the Parr Rheumatic Prize has been awarded to Dr. S. G. Anderson of the Walter and Eliza Hall Institute of Medical Research, Melbourne. The subject of Dr. Anderson's study was "Epidemic Polyarthritis in

Australia and the Island of New Guinea with special reference to an Epidemic Exanthem Associated with Polyarthritis in the Murray Valley in 1956".

The prize is awarded each three years "for the best contribution to Rheumatic Research throughout Australia during the preceding three years" in the terms of the will of the late Leslie James Albert Parr.

Swedish Research Scholarship, 1962.

The Swedish National Association against Heart and Chest Disease is offering a Research Scholarship for 1962 under the auspices of the World Health Organization. The award is open to a non-Swedish cardiologist of under 45 years of age who should have proved ability in research, be engaged in active research and be interested in studying a particular problem in Sweden. The stipend will amount to 25,000 Swedish crowns for one year. Applications close on January 31 and should be lodged with the Chief, Cardiovascular Diseases Unit, W.H.O., Palais de Nations, Geneva, Switzerland. Further information may be obtained from Dr. K. Maddox, Sydney; Dr. T. E. Lowe, Melbourne; or Dr. J. M. McPhie, Adelaide.

National Heart Foundation of Australia.

Dr. Ralph Reader of Sydney has been appointed medical director of the National Heart Foundation of Australia. He will move to Canberra to take up his duties with the Foundation on December 4, 1961.

British Council Films.

From time to time medical and dental films will now be added to the British Council stock in Australia. Films are distributed by the British Information Office, 16-20 Bridge Street, Sydney, to whom applications for loans should be made. The following films have just arrived and are immediately available: "Abdominal Total Hysterectomy: A New Technique—Posterior Approach" (colour, sound film, produced in 1957 by the Royal Society of Medicine, for Mr. Frank L. E. H. Musgrove; running time 20 mins.). "The Correction of Uniocular Aphakia by Means of Anterior Chamber Acrylic Implants" (silent colour film produced by Mr. J. Wood in 1958 for Mr. D. P. Choyce; running time 20 mins.). "The Early Diagnosis of Cerebral Palsy" (black and white, sound film, produced in 1959 by the Department of Medical Photography, Royal Hospital, Sheffield, for the Department of Child Health, University of Sheffield; running time 30 mins.). "The Effect of Oxygen on Retinal Vessels" (black and white and colour, silent, produced in 1957 by Institute of Ophthalmology for Dr. Ashton; running time 16 mins.). "Use of the Artificial Kidney" (colour, sound, produced in 1958 by Department of Medical Photography, Postgraduate Medical School of London, for the Department of Surgery; running time 16 mins.). "Noradrenaline and Adrenaline" (colour, sound film, produced in 1959 by the Department of Medical Illustration, St. Mary's Hospital Medical School, for Riker Laboratories Ltd.; running time 23 mins.). "The Problem of Senile Cataracts" (silent colour film produced by Mr. J. Wood in 1958 for Mr. D. P. Choyce; running time 18 mins.). "Thirty-Two of Her Own" (colour, sound film, produced in 1952 by Realist Film Unit for General Dental Council; running time 22 mins.). "Guilty or Not Guilty" (technicolor, sound film, produced in 1960 by Technical and Scientific Films for the General Dental Council; running time 15 mins.).

The College of Radiologists of Australasia.

The names of the successful candidates in Part II of the examination for membership of the College of Radiologists of Australasia, held in August, 1961, are as follows:

In radiodiagnosis: Dr. A. Bardsley, Victoria; Dr. M. S. Benson, Victoria; Dr. Fay Grote, Victoria; Dr. G. J. Harrington, New South Wales; Dr. T. S. Lamond, New South Wales; Dr. S. Manea, Victoria; Dr. A. D. Smythe, Victoria.

Standard for Anæsthetics.

Within recent months several new Australian standards have been issued by the Standards Association as part of the scheme administered by the Australian Dental Association for the accreditation of dental materials used in Australia. The latest standard in this series applies to local anæsthetics for dental injection. To be known as A.D.S. No. T.19, the standard has been based on the work of the Commonwealth Bureau of Dental Standards and the American Dental Association. The standard applies to local anæsthetics supplied as liquid or tablets, and specifies all necessary requirements. Testing for compliance with the standard is carried out by methods described in a series of appendices. Other recent dental standards issued by the Standards Association are A.D.S. No. T.20 for synthetic resin teeth, and A.D.S. No. T.21 for dental X-ray films. Copies of the standards are obtainable from the offices of the Standards Association. The prices are as follows: T.19—7s. 6d., T.20—4s., T.21—4s. Postage is additional.

Seminar on Group Practice.

The first section of the meeting of the Australian College of General Practitioners held in Adelaide on October was a seminar on group practice held under the auspices of the Francis Hardey Faulding Research Memorial. The seminar honoured Francis Hardey Faulding, the physician founder of the firm of F. H. Faulding & Co. Ltd., which entertained members of the College and their wives at a buffet dinner before the seminar.

Journals Wanted.

The following numbers of THE MEDICAL JOURNAL OF AUSTRALIA are in short supply: April 11, 1959; August 22, 1959; July 2, 1960; August 27, 1960; March 25, 1961. If anyone has spare copies of these numbers, we should be glad to receive them. They should be addressed to the Manager, Australasian Medical Publishing Co. Ltd., The Printing House, Seamer Street, Glebe, N.S.W.

Post-Graduate Work.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Overseas Visitor: Dr. Mary Crosse.

THE Post-Graduate Committee in Medicine in the University of Sydney announces that the following lectures by Dr. Mary Crosse are open to members of the annual subscription course: Wednesday, November 22, 7.30 p.m., I.C.I. Theatrette, east Circular Quay entrance, "The Care of the Premature Baby in Hospital and in the Community"; Thursday, November 23, 4.30 p.m., Main Lecture Hall, The Women's Hospital, Crown Street, "The Complications of Prematurity"; Friday, November 24, 2 p.m., Students' Common Room, Royal North Shore Hospital of Sydney, "The Care of the Premature Baby'; Monday, November 27, 4.30 p.m., King George V Lecture Theatre, King George V Memorial Hospital, "The Prognosis of the Premature Baby"; Wednesday, November 29, 2 p.m., Nurses' Lecture Theatre, Royal Hospital for Women, Paddington, "The Feeding of Premature Babies".

SEMINARS AT SYDNEY EYE HOSPITAL.

SEMINARS will be held at the Sydney Eye Hospital (Sydney Hospital), Sir John Young Crescent, Woolloomooloo, on the second Wednesday of every month at 5.30 p.m., commencing on November 8, 1961. The seminars will last one hour and all medical graduates interested in ophthalmology are invited to attend.

THE MELBOURNE MEDICAL POST-GRADUATE COMMITTEE.

SUMMARY OF COURSES TO BE CONDUCTED IN MELBOURNE IN 1962.

THE following schedule has been drawn up as a guide for those who may be planning post-graduate study in Melbourne in 1962.

Courses for Higher Qualifications.

Part I.

The following courses are suitable for candidates for Part I of M.D., M.S., M.G.O., D.O., D.L.O., D.P.M., D.D.R., D.T.R., D.A., primary F.R.A.C.S., primary F.F.A.R.A.C.S., and Part I of the Diplomas of The College of Radiologists of Australia.

Anatomy.—The course commences on February 19 and is conducted on Monday and Wednesday afternoons till September.

Physiology.—The course commences on February 26 and is arranged similarly to that in anatomy.

Pathology.—A course commences on March 5 and is conducted on Monday and Wednesday afternoons for four months. A course in pathology for F.R.A.C.S. and F.F.A.R.A.C.S. begins in late June and continues for six weeks.

Microbiology.—This course commences on April 3 and is conducted on Tuesday afternoons for 15 to 20 weeks.

Physics.—A course in physics for radiodiagnosis commences on March 29 and is conducted on Thursday afternoons for 18 weeks. A course in physics for radiotherapy will commence on March 29 and will be conducted on Thursdays for six weeks and then on Tuesdays for 12 weeks.

Psychology I.—This course, conducted by the University of Melbourne, will commence on March 13 and continue, for five hours per week, till October 19.

Coaching Course in Anatomy, Physiology and Pathology.—This course, for the primary fellowship, will be conducted from January 15 full-time for six weeks, for candidates who have already studied extensively, either by attendance at courses or privately. The 1962 class is already filled.

Anatomy, Physiology, Pharmacology and Pathology for Primary F.F.A.R.A.C.S.—A course conducted by the Faculty of Anæsthetists of the Royal Australasian College of Surgeons (Victorian Division) will commence on February 20. It will consist of evening tutorials conducted weekly, for four months.

Note.—Candidates are advised to undertake preliminary reading before commencing any of the Part I courses. The Committee conducts all the above-mentioned courses except the psychology course and the F.F.A.R.A.C.S. tutorials.

Part II.

Medicine.—For senior medical qualifications, such as M.D. or M.R.A.C.P., the honorary medical staff at Prince Henry's Hospital will conduct a course in medicine, commencing in the autumn or early winter and continuing for six or eight weeks.

Surgery.—For senior surgical qualifications, such as M.S. or F.R.A.C.S., the Royal Australasian College of Surgeons' Victorian State Committee will conduct a course in surgery, full-time for 10 weeks, five afternoons per week, commencing on July 30.

Microbiology.—A basic course in microbiology for M.S., M.G.O. and the diplomas will commence on April 3 and continue on Tuesday afternoons for 15 to 20 weeks.

Pathology.—A basic course in pathology will commence on March 5 and continue on Monday and Wednesday afternoons for four months. This will be suitable for candidates for M.S., M.G.O., and the diplomas.

Psychiatry and Neuropathology.—For candidates for D.P.M., the Australasian Association of Psychiatrists will conduct part-time courses in psychiatry and neuropathology, commencing in mid-March and continuing over a period of months in evening lectures. The Post-Graduate Committee will conduct a short course of evening lectures in neuropathology, commencing late in August. The Mental Hygiene Authority will conduct a course of 15 lecture-demonstrations and 15 tutorials in neuropathology from June to September.

Psychopathology.—The University of Melbourne will conduct a course in psychopathology, part-time for seven months, from March 13.

Ophthalmology and Special Pathology.—For candidates for D.O., the Ophthalmological Society of Australia (Victorian Division) will conduct 80 lectures in ophthalmology and special pathology, chiefly in the late afternoons, commencing at the end of April.

Theory and Practice of Anæsthetics.—For D.A. and F.F.A.R.A.C.S. candidates, the Victorian State Committee of the Faculty of Anæsthetists will conduct an afternoon course of lectures, commencing on July 2 and continuing for two weeks. Hospital visits will be arranged in the mornings.

Other Courses.—The following courses will be conducted at times arranged when sufficient candidates present, and those interested should get into touch with the Post-Graduate Committee without delay: (i) a course in radiodiagnosis and special pathology, to be conducted by the Post-Graduate Committee in consultation with The College of Radiologists of Australia; (ii) a course in laryngology, otology and pathology, to be conducted by the Victorian Division of the Australian Oto-Laryngological Society. The College of Radiologists of Australia will give guidance in arrangement of study in radiotherapy and relevant pathology, and the Victorian Committee of the Royal College of Obstetricians and Gynæcologists and the Obstetrics Department of the University of Melbourne will advise on study in gynæcology, obstetrics and special pathology.

Refresher Courses.

A gynæcology and obstetrics refresher course for recent graduates has been arranged at the Royal Women's Hospital, to commence on February 5, and will continue full-time for two weeks. Residence will be available. Entries close on January 5, and commencement depends on receipt of a satisfactory number of enrolments.

A gynæcology and obstetrics refresher course for general practitioners will be conducted at the Royal Women's Hospital for two weeks, full-time, from October 1. Residence will be available.

Medical and surgical refresher courses for general practitioners will be conducted by the hospital staffs for four periods of one week each, full-time, as follows: (i) at Prince Henry's Hospital, from March 19 to 23; (ii) at the Royal Melbourne Hospital, from April 9 to 13; (iii) at the Alfred Hospital, from August 6 to 10; (iv) at St. Vincent's Hospital, from September 10 to 14.

The senior medical staff of the Royal Children's Hospital will conduct a pædiatric post-graduate week, commencing on a date to be announced.

The honorary staff at the Royal Victorian Eye and Ear Hospital will conduct demonstrations on the mornings of Saturdays, March 24 and September 15, after the courses at Prince Henry's Hospital and St. Vincent's Hospital.

Enrolment.

Commencement of courses depends on receipt of a satisfactory number of enrolments, the closing date in each case being two weeks before the date set down for commencement, unless otherwise stated. Inquiries regarding all courses should be made through the conducting body, or may be addressed to the Melbourne Medical Post-Graduate Committee. The Committee's address is 394 Albert Street, East Melbourne, C.2, telephone 32-2547.

Naval, Military and Air Force.

APPOINTMENTS.

THE following appointments, changes, etc., are published in the *Commonwealth of Australia Gazette*, No. 73, of September 15, 1961.

AUSTRALIAN MILITARY FORCES.

Citizen Military Forces.

Northern Command.

Royal Australian Army Medical Corps (Medical).—The provisional rank of 161844 Captain A. Davidson is confirmed. 139200 Captain N. C. Davis is appointed from the Reserve of Officers, 4th August, 1961. *To be Major, 18th August, 1961*—139200 Captain N. C. Davis. The provisional appointment of 139252 Captain R. H. G. Apel is terminated, 19th May, 1961. *To be Captain (provisionally), 20th May, 1961*—139252 Roderick Hans Gibson Apel.

Southern Command.

Royal Australian Army Medical Corps (Medical).—350312 Lieutenant-Colonel (Temporary Colonel) A. V. Jackson, Assistant Director-General of Medical Services, Consultant Pathologist, Directorate of Medical Services, Army Headquarters, is appointed Consultant Pathologist, Directorate of Medical Services, Army Head-quarters, 1st July, 1961.

The Royal Tasmania Regiment.—Royal Australian Army Medical Corps (Medical).—69210 Major A. C. D. Corney is appointed Commanding Officer, 10th Field Ambulance, and to be Temporary Lieutenant-Colonel, 11th August, 1961. 615251 Major (Temporary Lieutenant-Colonel) J. C. S. Officer relinquishes command 10th Field Ambulance, 10th August, 1961. 615338 Colonel C. W. Clarke relinquishes the appointment of Assistant Director of Medical Services, Head-quarters, The Royal Tasmania Regiment (with pay and allowances of Lieutenant-Colonel), 10th August, 1961, and is transferred to the Reserve of Officers (Royal Aus-

tralian Army Medical Corps (Medical)) (Southern Command), 11th August, 1961.

Western Command.

Royal Australian Army Medical Corps (Medical).—Captains 538069 D. H. Wallace and 538067 B. A. Kakulas are transferred to the Reserve of Officers (Royal Australian Army Medical Corps) (Medical) (Western Command), 18th July, 1960. *To be Captain (provisionally), 23rd August, 1961*—526709 Constantine Agapitos Michael.

Reserve Citizen Military Forces.

Northern Command.

Royal Australian Army Medical Corps (Medical).—To be Honorary Captain, 14th August, 1961—John Clement Windsor.

Eastern Command.

The following officers are placed upon the Retired List (Eastern Command), and granted a military title equivalent to the substantive or honorary rank shown, with permission to wear the prescribed uniform, 31st August, 1961:—

Royal Australian Army Medical Corps (Medical).—Lieutenant-Colonel S. D. Meares and Captain R. G. Wright.

Royal Australian Army Medical Corps (Medical).—Honorary Lieutenant C. E. E. Roberts is retired, 31st August, 1961.

Southern Command.

Royal Australian Army Medical Corps (Medical).—The resignation of Honorary Captain R. E. Ashbarry of his commission is accepted, 7th August, 1961.

ROYAL AUSTRALIAN AIR FORCE.

Permanent Air Force.

Medical Branch.

Flight Lieutenant R. P. Quirk (0314324) is appointed to a four year short service commission on probation for a period of twelve months, 15th January, 1961, with the rank of Flight Lieutenant and with seniority as from 21st December, 1959.

Flight Lieutenant R. K. L. Tebbutt (0211575) is granted the acting rank of Squadron Leader, 13th June, 1961.

Squadron Leader (acting Wing Commander) E. R. Bowler (0310759) ceases to hold the acting rank of Wing Commander, 16th August, 1961.

Keith Malcolm Hoole (019851) is appointed to a temporary commission, 1st April, 1960, with the rank of Pilot Officer (student).

The resignation of Flight Lieutenant P. E. Connor (019761) is accepted, 17th July, 1961.

Active Citizen Air Force.

Medical Branch.

No. 21 (City of Melbourne) (Auxiliary) Squadron.—John Talbot Sykes (0315313) is appointed to a commission on probation for a period of twelve months 16th March, 1961, with the rank of Flight Lieutenant.

No. 23 (City of Brisbane) (Auxiliary) Squadron.—Clyde Francis Wynzar (277688) is appointed to a commission, 16th November, 1960, with the rank of Flight Lieutenant.

No. 24 (City of Adelaide) (Auxiliary) Squadron.—Ian Winston Hocking (043743) is appointed to a commission, 1st March, 1961, with the rank of Flight Lieutenant.

The appointment of each of the following Flight Lieutenants is terminated:—F. A. J. Hetherington (6381), 15th July, 1961; B. F. Loughnan (257783), 17th July, 1961.

Air Force Reserve.

Medical Branch.

Reginald Motteram (258020) is appointed to a commission 18th February, 1961, with the rank of Squadron Leader.

Each of the following is appointed to a commission, 1st July, 1961, with the rank of Flight Lieutenant:—Hugh Simpson Millar (258023), Keith Howard Langford (258024), William Louther Armstrong (258025).

Each of the following Flight Lieutenants (temporary Squadron Leaders) is promoted to the temporary rank of Wing Commander, 15th June, 1961:—L. J. T. Murphy (251208), R. A. Craven (268106).

Flight Lieutenant T. F. Spring (257877) is promoted to the temporary rank of Squadron Leader, 15th June, 1961.

Each of the following Flight Lieutenants is placed on the Retired List, 1st August, 1961:—C. R. E. Downing (1459), H. G. Rich (2567), H. L. Chester (2286), E. R. Edwards

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED OCTOBER 28, 1961.[1]

Disease.	New South Wales.[2]	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.[2]
Acute Rheumatism	..	..	1	1	..	..	..	..	2
Amœbiasis	..	..	..	..	1	..	..	..	1
Ancylostomiasis	..	..	..	..	..	..	2	..	2
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	2	..	..	..	..	..	..	..	2
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	..	..	..	..	..	..	..	..
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	21(18)	4(2)	1(1)	..	..	4	..	..	30
Diphtheria	..	..	..	..	..	..	..	..	..
Dysentery (Bacillary)	3(1)	..	..	10(9)	..	1	..	..	14
Encephalitis	..	..	..	..	..	..	..	..	..
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	1	..	..	..	1	..	..	..	2
Infective Hepatitis	73(31)	16(8)	27(16)	4(1)	8(3)	..	2	..	130
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	1(1)	..	..	..	..	7	..	..	8
Leptospirosis	..	..	..	..	..	..	..	..	..
Malaria	..	2	..	..	..	..	..	..	2
Meningococcal Infection	..	..	1(1)	..	..	..	..	..	1
Ophthalmia	..	..	..	3	..	..	..	..	3
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	..	3(3)	..	..	..	..	..	..	3
Puerperal Fever	..	..	..	..	..	..	..	..	..
Rubella	20(15)	2	5(4)	7(5)	..	..	1	35
Salmonella Infection	..	..	2(2)	1(1)	..	..	..	..	3
Scarlet Fever	6(2)	6(2)	4(1)	2(2)	..	..	..	..	18
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	1	..	..	..	..	..	..	..	1
Trachoma	..	..	..	20	..	..	..	..	20
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	26(17)	12(2)	5(3)	7(6)	3(1)	..	..	..	53
Typhoid Fever	1(1)	..	..	..	..	1	..	..	2
Typhus (Flea-, Mite- and Tick-borne)	..	..	..	..	..	..	..	..	..
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

[2] Figures incomplete owing to absence of returns from New South Wales.

(252062), J. L. Roberts (2397), D. A. Carter (2744), G. E. Bevan (2895), L. J. L. Price (3181), M. C. McKinnon (3935), H. R. P. Boucaut (2873), A. C. Herrington (6327), F. E. Browne (256800), R. H. Oxby-Donald (255253), P. R. Houghton (257600).

The Royal Australasian College of Physicians.

VICTORIAN STATE COMMITTEE: SCIENTIFIC MEETING.

THE Victorian State Committee of The Royal Australasian College of Physicians will conduct a scientific meeting on "Medical Disorders of Pregnancy", at the Royal Women's Hospital (Tracey House), Swanston Street, Carlton, on Saturday, November 25, 1961, commencing at 11.30 a.m. All medical practitioners are invited to be present. The programme is as follows: 11.30 a.m., "Anæmia in Pregnancy", Dr. M. Whiteside; 12 noon, "Malignant Disease in Pregnancy", Dr. J. P. Madigan; 12.30 p.m., "Maternal Factors in Relation to Congenital Malformations", Dr. David Pitt; 2.15 p.m., "Diabetes in Pregnancy", Dr. Pincus Taft; 2.45 p.m., "High Blood Pressure in Pregnancy", Professor L. Townsend; 3.15 p.m., "Heart Disease in Pregnancy", Dr. M. Etheridge.

Notice.

THORACIC SOCIETY OF AUSTRALIA (N.S.W. BRANCH).

THE distinguished Australian thoracic surgeon, Mr. W. P. Cleland, of the Brompton Hospital, King's College Hospital, and the Postgraduate Medical School, London, now visiting Australia, has consented to speak under the auspices of the Thoracic Society of Australia (N.S.W. Branch) on Monday, November 20, 1961, at 8 p.m., at the Stawell Hall, 145 Macquarie Street, Sydney. His lecture is entitled "Secondary Lung Tumours", and the Society extends a cordial welcome to all members of the medical profession to attend as its guests.

THE COLLEGE OF RADIOLOGISTS OF AUSTRALASIA.

Examinations for Diploma.

THE College of Radiologists of Australasia will be holding examinations for the Diploma of the College commencing on Monday, March 5, 1962, for Part I and Part II. Part I is held in the candidate's own State, and Part II examination will be held in Melbourne. Full details and application forms are available from the office of the College, 12th Floor, 135 Macquarie Street, Sydney. Entry forms must be received at the College office in Sydney not later than January 8, 1962.

THE COLLEGE OF PATHOLOGISTS OF AUSTRALIA.

Examination for Membership.

APPLICATIONS to sit for the membership examination (general and special) to be conducted during 1962 by the College of Pathologists of Australia should be lodged with the Councillor representing members resident in the State in which the applicant resides. Applications close on February 28, 1962, and must be accompanied by the appropriate fee.

The State representatives are as follows: Queensland—Dr. A. W. Pound, Pathology Department, Brisbane General Hospital, Brisbane; New South Wales—Dr. B. Basil-Jones, 81 Shaftesbury Road, Burwood; Victoria—Dr. J. D. Hicks, c/o Post Office, Royal Melbourne Hospital, Parkville, N.2; South Australia—Dr. J. A. Bonnin, Institute of Medical & Veterinary Science, Frome Road, Adelaide; Tasmania—Dr. T. A. Nowell, Commonwealth Department of Health, Commonwealth Health Laboratories, Free Bag, Launceston; Western Australia—Dr. R. A. Barter, Department of Pathology, School of Medicine, Victoria Square, Perth.

Written examinations will be held during the last week in June in the capital cities according to the place of residence of applicants. Viva-voce examinations will be conducted in Sydney in August, 1962. Full details and application forms may be obtained from the Honorary Secretary, 135 Macquarie Street, Sydney.

Diary for the Month.

NOVEMBER 21.—New South Wales Branch, B.M.A.: Medical Politics Committee.
NOVEMBER 22.—Victorian Branch, B.M.A.: Branch Council Meeting.
NOVEMBER 23.—New South Wales Branch, B.M.A.: Clinical Meeting.
NOVEMBER 24.—Queensland Branch, B.M.A.: Council Meeting.
NOVEMBER 28.—New South Wales Branch, B.M.A.: Hospitals Committee.
NOVEMBER 30.—New South Wales Branch, B.M.A.: Branch Meeting.
NOVEMBER 30.—South Australian Branch, B.M.A.: Scientific Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): Medical Officers to Sydney City Council. All contract practice appointments in New South Wales. Members are requested to consult the Medical Secretary before undertaking practice in dwellings owned by the Housing Commission.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

Editorial Notices.

ALL articles submitted for publication in this Journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations, other than those normally used by the Journal, and not to underline either words or phrases.

Authors of papers are asked to state for inclusion in the title their principal qualifications as well as their relevant appointment and/or the unit, hospital or department from which the paper comes.

References to articles and books should be carefully checked. In a reference to an article in a journal the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of article. In a reference to a book the following information should be given: surname of author, initials of author, year of publication, full title of book, publisher, place of publication, page number (where relevant). The abbreviations used for the titles of journals are those of the list known as "World Medical Periodicals" (published by the World Medical Association). If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full data in each instance.

Authors submitting illustrations are asked, if possible, to provide the originals (not photographic copies) of line drawings, graphs and diagrams, and prints from the original negatives of photomicrographs. Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary is stated.

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